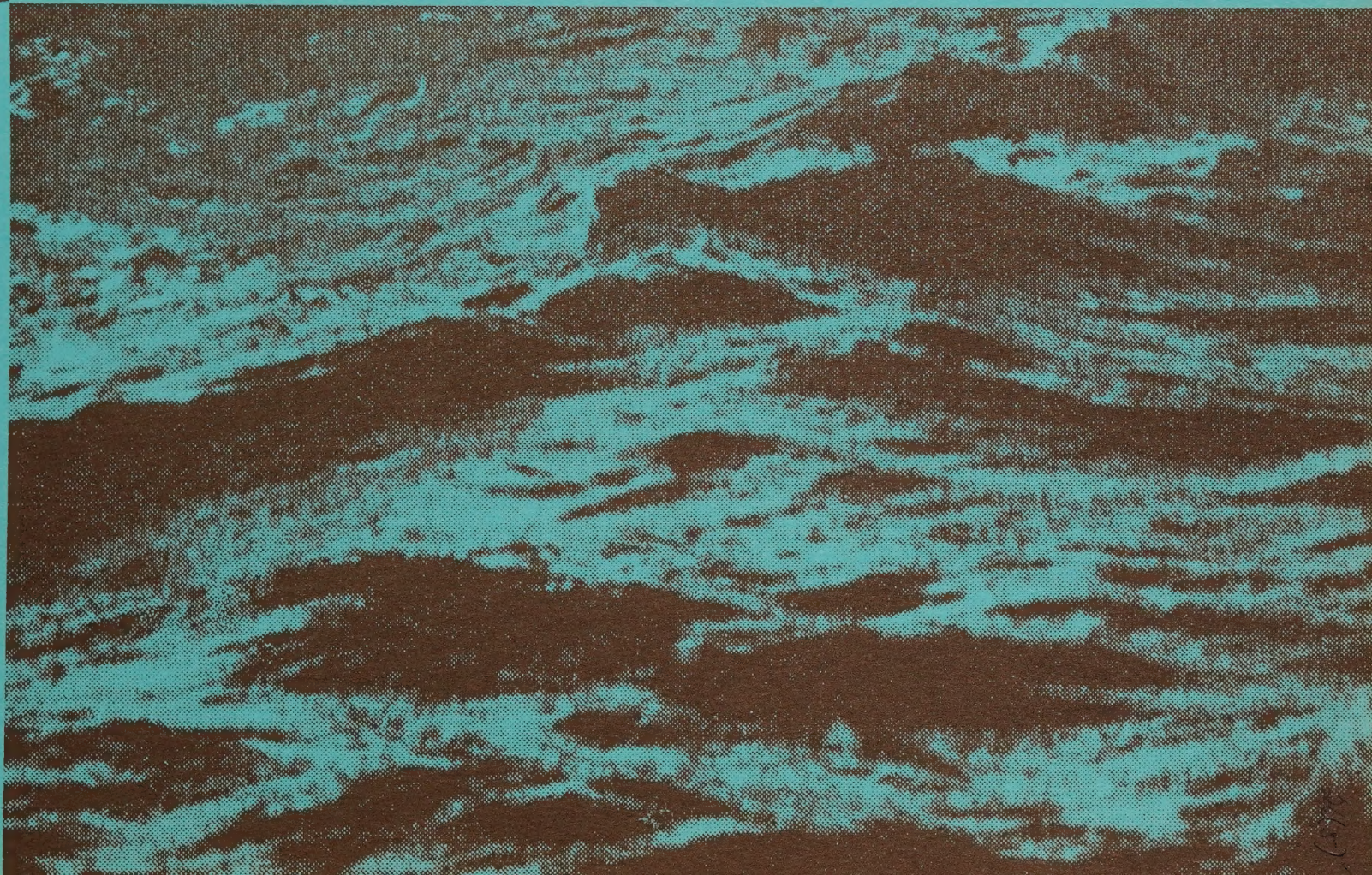
DEPARTMENT OF COMMERCE PUBLICATION

Marine Fisheries Abstracts

LIBRARY
APR 4 1973

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service



MAY 1973

VOLUME 26
NUMBER 5

Seattle, Wash.

UNITED STATES DEPARTMENT OF COMMERCE

Frederick B. Dent, *Secretary*

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Robert M. White, *Administrator*

NATIONAL MARINE FISHERIES SERVICE

Philip M. Roedel, *Director*

FOREWORD

The Department of Commerce's National Marine Fisheries Service publishes the monthly journal *Marine Fisheries Abstracts* as one means of communicating to the fishing industry and allied groups the status of current fishery research. The research includes the biological aspects of fishery science as well as technological studies dealing with aquatic resource supply, harvesting, processing, utilization, and distribution.

Marine Fisheries Abstracts contains summaries of selected articles from trade, engineering, and scientific journals dealing with the entire spectrum of fishery science. The publication is designed to serve the needs of fishery scientists, engineers, and managers in industry, academic institutions, and government by supplying timely information on current progress in fishery research and technology.

For sale by the Superintendent of Documents, U.S. Government Printing Office Washington, D.C. 20402 - Subscription price: $6.50 per year, ($1.75 additional for foreign mailing). Single copy 65 cents.

0.35 CHOLESTEROL-CEREBROSIDE INTERACTION: THE ROLE OF α-HYDROXY FATTY ACIDS

Mickel, Hubert S., and Penelope L. Hill (Children's Hospital Medical Center, 300 Longwood Ave., Boston, MA 02115)
Lipids 7, No. 11, 733-737 (Nov. 1972)

The researchers examined the esterification of cholesterol by the plasma phosphatidyl choline-cholesterol acyltransferase reaction using two methods, radioisotopic and colorimetric, in the presence of cerebroside, ceramide, or methyl esters of lignoceric or α-hydroxy lignoceric acid. They demonstrated an interaction between free cholesterol and cerebroside or ceramide containing α-hydroxy fatty acids. The nature of the interaction was not elucidated. Cholesterol and cerebroside are components of the myelin sheath. It is possible that the interaction between cholesterol and α-hydroxy fatty acid cerebroside may result in greater cohesiveness of the myelin sheath.
[2 figures, 4 tables, 13 references] FTP

0.36 ASCORBIC ACID AND FAT CONTENT IN THE RED AND WHITE MUSCLES OF CARP, CATLA CATLA

Krishnamoorthy, R. V., and T. Narasimhan (Dept. of Zoology, Bangalore University, Bangalore 1, India)
Comparative Biochemistry and Physiology 43, No. 4B, 991-997 (Dec. 15, 1972)

In comparisons of red muscle to white muscle other reports indicated that red muscle has a higher myoglobin content, characteristic sarcoplasmic proteins, higher succinic dehydrogenase and respiratory enzymes, greater fatty acid oxidation and lecithinase activity, greater oxygen consumption, less water, and more glycogen and lipids. The reports also correlated the metabolic and structural differences to the functional differences: the red muscle is the sole source of motive power of the fish for swimming at slow and cruising speeds. Since ascorbic acid is a major influence in oxidative metabolism, enzyme systems, and other physiological activities, tests were performed to determine the ascorbic acid content, degradation products of ascorbic acid, and fat content of red and white lateral muscles of the carp.

The results indicated that there is three times more fat and 2% less water in red muscle, and the fat is more saturated than that in white muscle. White muscle contained 2.5 times more ascorbic acid than red muscle. White muscle contained 2.5 times more of the metabolite hydroascorbic acid (ASA); red muscle contained 13 times more dehydroascorbic acid (DHA) and 4 times more diketogulonic acid (DKA). These two acids are stepwise products of hydroascorbic acid

(over)

0.35 (9.13) VARIATIONS IN SERUM CONSTITUENTS OF THE BLUE CRAB, CALLINECTES SAPIDUS: CHLORIDE AND OSMOTIC CONCENTRATIONS

Lynch, M. P., K. L. Webb, and W. A. Van Engel (Depts. of Environmental Physiology and Crustaceology, Virginia Institute of Marine Science; and School of Marine Science, College of William and Mary, Gloucester Point, VA 23062)
Comparative Biochemistry and Physiology 44, No. 3A, 719-734 (Mar. 1, 1973)

The densities of the populations of blue crab often fluctuate from year to year, and the reasons for these fluctuations are not fully known. Previously, it was suggested that cold weather and low salinity (due to high river discharge) might be responsible, but the evidence was not conclusive. Blue crabs in the waters of Virginia are found in salinities from about 30-32 ‰ to fresh water. It was suggested that use of the proper chemical or physiological indices might be useful for predicting future abundance of blue crab. Variations in serum chloride and serum osmotic levels in mature, hard blue crabs were examined under the various environmental conditions of salinity and temperature found in Virginia waters.

Serum chloride and serum osmotic concentration in the blue crab vary seasonally, with the highest levels occurring during the winter and the lowest levels in the summer. This seasonal variation was related primarily to changes in temperature. During March through October (temperature of 21°-29° C. and salinity of <1-31 ‰), the serum chloride is maintained hyperionic to the medium below salinities of about 21 ‰, isoionic from 21 to 25 ‰, and hypoionic above 25 ‰. Serum osmotic level is maintained hyperosmotic below 25 ‰ and isoionic above 25 ‰.

(over)

0.36 (7.8) HEXOSE MONOPHOSPHATE ACCUMULATION AND RELATED METABOLIC CHANGES IN UNFROZEN AND THAWED ADDUCTOR MUSCLE OF THE SEA SCALLOP (PLACOPECTEN MAGELLANICUS)

Hiltz, Doris Fraser, and W. J. Dyer (Fisheries Research Board of Canada, Halifax Laboratory, Halifax, Nova Scotia, Canada)
Journal of the Fisheries Research Board of Canada 30, No. 1, 45-52 (Jan. 1973)

This work indicates that extensive metabolic changes brought about by thawing frozen scallops (meat) may affect the quality of the thawed product. During chill storage of the meats (adductor muscle) of scallops the hexose monophosphates (glucose-6-phosphate [G6P], fructose-6-phosphate, and glucose-1-phosphate) accumulated postmortem; they increased from only traces at death to levels totaling about 10 μmole/g. after 8-10 days. G6P accounted consistently for 80-85% of the total hexose monophosphate in unfrozen (chilled) and thawed meats. Quick freezing the meats any time postmortem did not affect the level of hexose monophosphates or related metabolic constituents. When the muscle is frozen prerigor and then thawed, either slowly or rapidly, considerable formation of G6P occurs and the subsequent rate and extent of G6P production is markedly accelerated. Thawed meats stored 1-2 days at 5° C. accumulated high levels of G6P (~20 μmole/g.); these high levels appear to cause burned flavors, odors, and discolorations in the cooked thawed meats. Some hypoxanthine (Hx) and octopine formed while the prerigor-frozen muscle was thawing; however, the subsequent rate of Hx accumulation at 5° C. was three times faster in the thawed meats than in the unfrozen meats. When these meats were frozen postrigor, thawing resulted in negligible

(over)

0.35 (9.13)

During the winter (November through February) serum osmotic level is elevated and the crabs would most likely be hyperosmotic over the entire salinity range (32 ‰ to fresh water). The serum chloride would likely be hyperionic to the medium over the entire salinity range.
[4 figures, 5 tables, 42 references] FTP

0.36 (7.8)

change in concentrations of the metabolites; the subsequent patterns of change during storage differed little from those in the unfrozen muscle, except that Hx accumulation was more rapid. Hx may possibly serve as an index of quality in thawed scallop muscle.

These results emphasize the inadvisability of thawing scallop meats for retail sale. Furthermore, it would be desirable to cook scallop meats from the frozen state to preserve the flavor and textural qualities of prerigor quick-frozen muscle.
[5 figures, 28 references] FTP

0.35 SOME PHYSICO-CHEMICAL CHARACTERISTICS OF CARP MYOSIN B

Pyeun, Jae Hyeung
Bull. Kor. Fish. Soc. 4, No. 2, 57-62 (1972) [9 figures, 13 references]
Korean Scientific Abstracts 4, No. 5, Abstract No. 72/541, 157 (Oct. 1972)

The physical and chemical characteristics of natural actomyosin extracted from the dorsal muscle of the carp are described. FTP

0.33 ELECTROPHORETIC STUDY OF SERUM PROTEINS AND (7.1) CRYSTALLIN OF MERLUCHE OF THE NORTHWEST AFRICAN COAST

Pichot, P. (Inst. Pêches Marit., Sete, France)
Chemical Abstracts 77, No. 17, 111756k (Oct. 23, 1972)

0.35 CALCIFICATION AND SYNTHESIS OF SKELETAL ORGANIC MATERIAL
(9.13) IN THE CORAL, POCILLOPORA DAMICORNIS (L.)
(ASTROCOENIIDAE, SCLERACTINIA)

Young, Stephen D. (Dept. of Zoology, University of California, Los Angeles, CA 90024)
Comparative Biochemistry and Physiology 44, No. 2A, 669-672 (Feb. 1, 1973)

The greater mass of the coral skeleton consists of aragonitic calcium carbonate crystals, but a significant amount of organic material of unknown function is also present. In the present study an examination was made of the relationship between new mineral deposition and the synthesis of new skeletal organic material in the coral P. damicornis (L.). In the tests, an attempt was made to inhibit protein synthesis with puromycin. The coral species contains protein, lipid, and chitin in the skeletal organic material.

The tips of the coral branches were incubated in the light in sea water containing $Na_2{}^{14}CO_3$ in the presence of puromycin dihydrochloride. Under such conditions, without puromycin, carbonate is incorporated directly into the skeletal mineral, and indirectly, through the symbiotic algae of the coral, into animal tissue and the skeletal organic material. In that way, the mineral and the organic material become labeled with ^{14}C. In acid, the mineral ^{14}C is released as CO_2; thus, the radioactivity in organic material is separated from the radioactivity in mineral material.

A significant correlation was found between synthesis of organic material and the deposition of calcium carbonate. Puromycin did not have a significant effect. Apparently, there is an interaction, before or during deposition, of skeletal organic material and mineral carbonate in the coral.
[1 figure, 19 references] FTP

0.36

metabolism. The ratio of ASA to DHA is an indicator of the extent of oxidation of ASA. The results of this analysis indicated that there is 30 times less oxidation of ASA to DHA in white muscle than red muscle. In contrast, in the red muscle, DHA is irreversibly hydrolyzed to DKA to an extent 5 times greater than in white muscle. ASA and DHA prevent oxidation of fats at double bonds and have antiscorbutic properties.

Postmortem changes or the effects of 0° C. storage for 1 week include: an increase in fat content in white muscle but not in red; ASA to DHA ratios decreased in both; the DHA to DKA ratio increased in white muscle and decreased in red; the iodine number increased three to four times in red muscle and did not change in white. Changes in iodine number and ascorbic acid content in these muscles are important as quality indicators from a nutritional point of view.
[5 tables, 27 references] SW

0.35 EFFECTS OF IONIC STRENGTH AND pH ON NEUTRAL SALT-SOLUBLE (1.953) COLLAGEN FROM SPERM WHALE NOSE CARTILAGE

Kubota, Minoru, Naoyuki Uchida, and Shigeru Kimura (Tokyo Univ. Fish., Tokyo, Japan)
Chemical Abstracts 78, No. 6, 31428k (Feb. 12, 1973)

0.38 PHOSPHOLIPASES OF MARINE INVERTEBRATES--I. DISTRIBUTION OF PHOSPHOLIPASE A

Vaskovsky, V. E., and Z. S. Suppes (Institute of Biologically Active Substances, Far East Science Centre Academy of Sciences of the U.S.S.R., Vladivostok-22, U.S.S.R.)
Comparative Biochemistry and Physiology 43, No. 3B, 601-609 (Nov. 15, 1972)

[The phospholipids are common in organisms and participate in important biochemical functions. They are the most polar of lipids reacting with either water soluble proteins or nonpolar lipids. They function to maintain the colloidal state of protoplasm; they are involved in intercellular transport; and they may be used in maintaining acid base balance. Phospholipids are abundant in egg yolk, myelin sheath of nerve, blood plasma and red blood cell membranes, and mitochondria. They are generally not found in depot fat. Lecithin is an example of a phospholipid.

Phospholipases are enzymes that catalyze phospholipid hydrolysis. They also are widespread in nature originating in plants, bacteria, snake venom, and organs of various animals. These enzymes act by removing the fatty acids in the phospholipid molecule; if the fatty acid is in the ß position, the enzyme is called phospholipase A. Removal of the fatty acid in the ß position of lecithin results in the product lysolecithin, a strong detergent and hemolytic agent.] Phospholipase activity in invertebrates has been reported to a limited extent.

The enzyme activity of 46 species of marine invertebrates, collected from Posiet Bay, Sea of Japan, were investigated. The preparations to be tested were

(over)

0.39 ORGANIZATIONAL CHANGES IN PHOSPHOLIPID MULTIBILAYERS INDUCED BY UNCOUPLERS OF OXIDATIVE PHOSPHORYLATION: A SPIN LABEL STUDY

Verma, Surendra P., Henry Schneider, and Ian C. P. Smith (Div. of Biological Sciences, National Research Council of Canada, Ottawa, Canada K1A OR6)
Archives of Biochemistry and Biophysics 154, No. 1, 400-406 (Jan. 1973)

A spin probe was used to study the effect of uncouplers of oxidative phosphorylation on the degree of organization of phospholipids in hydrated multilayers. Disruptive effects were observed which were dependent on pH, time, and the presence of cholesterol. Egg lecithin films containing no cholesterol had maximum disorganization at pH 4.0 regardless of the uncoupler used. The effect of uncouplers on the probe disorganization varied with time of exposure. These time effects indicated that relative movements of uncoupler, probe, and lipid molecules occur to produce new lipid organizations that are different from those after first exposure to uncoupler. The uncouplers used were 2,4-dinitrophenol, pentachlorophenol, and dicumarol.
[8 figures, 30 references] FTP

0.38 SIMULTANEOUS PARTIAL PURIFICATION OF STEROL ESTER HYDROLASE AND LIPASE FROM RABBIT PANCREAS

Morin, Robert J. (Dept. of Pathology, Los Angeles County Harbor General Hospital, Torrance, CA 90509)
Lipids 7, No. 12, 795-798 (Dec. 1972)

During work on the purification of a sterol ester hydrolase from rabbit pancreas, the author noted that lipase activity (glyceryl ester hydrolase) closely paralleled the activity of the sterol ester hydrolase, particularly when preparations which were not delipidated were used. Lipase has been used to help purify certain enzymes to free them from bound lipid material. It would be useful, therefore, to have available a combined preparation of lipase and sterol ester hydrolase. The procedure described in this paper is a rapid method for the simultaneous partial purification of these enzymes.

The sterol ester hydrolase and lipase from rabbit pancreatic aqueous extracts were partially purified simultaneously as follows: They were initially precipitated by a 50% ammonium sulfate preparation, followed by chromatography with sodium taurocholate on a 10% agarose gel column (0.5 million exclusion limit), followed by precipitation of both enzymes with heparin and $MnCl_2$. Sterol ester hydrolase was purified 39-fold and lipase was purified 42-fold (compared to initial extract). The two enzymes are similar in that both are able to act on emulsified or micellar substrates, require bile salts as essential cofactors, and in the presence of lipids apparently form high molecular weight lipoprotein complexes that enable their parallel purification by the sequence described in this report.
[1 figure, 1 table, 10 references] FTP

0.4 (6.190) ANTIBIOTICS AS FEEDSTUFF ADDITIVES: THE RISK-BENEFIT EQUATION FOR MAN

Kiser, J. S., G. O. Gale, and G. A. Kemp (American Cyanamid Company, Agricultural Division, Princeton, N.J.)
Critical Reviews in Toxicology 1, Issue 1, 55-99 (Sept. 1972)

This review is concerned with the use of antibiotics in animal feeds for improving animal health and growth. The toxicology of some of the antibiotics used in feed and some of the implications for man are also discussed.

For economic reasons, antibiotics have been used commercially in farm animal feed for about 20 years. Although the justification for the use of antibiotics is economic, the overriding consideration is the need to maintain the efficient system of intensive animal agriculture currently practical in the United States. During the past 30 years, increases in the value of land, cost of capital facilities (including equipment), and the rising price of and scarcity of labor have required intensification and concentration of livestock raising. The concentration of and ownership of animals have been particularly notable in the poultry and beef cattle industries. Apparently, the density of animals reared in confinement and the stress imposed during shipping of animals to central rearing facilities imposes situations conducive to the spread of infectious diseases. Quite likely, intensive rearing of farm animals would be impossible without the use of disease-preventing chemicals (such as the antibiotics used in feed).

Before it can be used commercially, an antibiotic intended for animal feed use must undergo extensive studies to determine the safety to animals and its fate

0.39 (6.32) ISOLATION AND IDENTIFICATION OF NATIVE AUXINS IN MARINE ALGAE

Abe, Hiroshi, Masaaki Uchiyama, and Rokuro Sato (Dept. of Plant Protection, Tokyo University of Agriculture and Technology, Fuchu, Tokyo, 183, Japan)
Agricultural and Biological Chemistry 36, No. 12, 2259-2260 (Dec. 1972)

[An auxin is a plant hormone. It is an organic substance which promotes growth along the longitudinal axis when applied in low concentrations to shoots of plants. The most widely occurring auxin is indole-3-acetic acid (IAA). Its presence has been demonstrated by biochemical tests or chromatography in a wide variety of flowering plants, algae, and fungi. Abstractor's note]

In studies of plant growth regulators in marine algae, auxinlike substances were found in the following species: Ulva pertusa (Kjellman), Undaria pinnatifida (Suringar), Gelidium amansii (Lamouroux), Hizikia fusiforme (Okamura), and Eisenia bycyclis (Setchell). Isolates from U. pinnatifida were examined and identified as auxins. About 10 μg. of the purified material was recovered from 1 kg. of fresh algae, in two fractions: A and B. After subjecting the two fractions to ultraviolet light the absorption spectra appeared to be similar to indole derivatives. Stepwise decomposition of fraction A to methyl indole-3-acetate and fraction B to methyl indole-3-carboxylate gave conclusive evidence that their structures were similar to those of auxins. The active fraction (A) was found to promote the growth of coleoptile sections of members of the genus Avena (oats), a standard test for auxins.
[2 figures, 1 table, 3 references] SW

0.4 (6.190)

after administration. The antibiotics approved for animal use must either disappear completely from animal tissues or remain in amounts too small to have any significant effect. There are no known instances of harmful effects in man resulting from antibiotic residues in meat. Serious side effects following oral administration of these antibiotics to humans are rare. Parenteral use has resulted in some incidence of serious side effects, and these cases have been frequently, but incorrectly, cited as potential hazards from the use of antibiotics in animal feed. It is clear, then, that the benefits derived from the use of antibiotics in animal feeds (economic and improved health of the animals) are in no way offset by any demonstrated risk to the health of the animal or of man.
[2 figures, 28 tables, 83 references] FTP

0.39 BIOCHEMICAL STUDIES ON MARINE ALGAL CONSTITUENTS. II. EVALUATION OF THE EXTRACTION AND PURIFICATION OF ALGINIC ACID FROM CYSTOSEIRA BARBATA

Abdel-Fattah, A. F., M. M. Hussein, and H. M. Salem (Lab. Microbiol. Chem., Natl. Res. Cent., Cairo, U.A.R.)
Chemical Abstracts 77, No. 15, 98533p (Oct. 9, 1972)

0.38

made from tissues of the hepatopancreas, intestines, and gonads. They were ground in sand and acetate buffer and centrifuged. The supernatant fluid was tested on the following phospholipid substrates: phosphatidyl choline, phosphatidyl ethanolamine, and sphingomyelin isolated from egg yolk. Chromatography techniques were used to determine the products of change; chemical tests were used to detect free fatty acids, choline, and choline containing lipids.

Only phospholipase A was detected in the preparations, and phosphatidyl choline was the phospholipid hydrolyzed most actively. Of the distribution of phospholipase in the organs of the invertebrates, preparations from hepatopancreas and intestines were more active than those from the gonads. The most active preparations were from tissues of representatives of the Gastropoda, the Polychaeta, and the Echinoidea. The least active were preparations from representatives of the Crustacea.
[1 table, 32 references] SW

0.38 METHOD FOR THE DETERMINATION OF LIPOPROTEIN LIPASE IN POSTHEPARIN PLASMA AND BODY TISSUES UTILIZING A TRIOLEIN-COATED CELITE SUBSTRATE

Posner, Israel, and Vitgilio Bosch (Hosp. Cent. Fuerzas Armadas, Caracas, Venezuela)
Chemical Abstracts 76, No. 7, 31609d (Feb. 14, 1972)

0.4 THE EFFECTS OF LOCAL ANESTHETICS ON LIPID MULTILAYERS. A SPIN PROBE STUDY

Butler, K. W., H. Schneider, and Ian C. P. Smith (Div. of Biological Sciences, National Research Council of Canada, Ottawa, Canada K1A OR6)
Archives of Biochemistry and Biophysics 154, No. 2, 548-554 (Feb. 1973)

Results of other work indicate that the effectiveness of anesthetics depends upon their interaction with the lipid, not with the protein, portion of membranes. Local anesthetics can block the transmission of impulses by nerves, alter the transport properties of skin, and change the osmotic fragility of red cells. These effects depend upon the pH of the aqueous medium and on the permeability of lipid films and liposomes.

The effects of a series of local anesthetics on lipid multilayers formed from ox brain white matter lipids were investigated using a spin-labeled analog of cholestane as the monitor of molecular structure. The local anesthetics, with a constant concentration and increasing pH values, disordered the films. The anesthetics promoted the formation of ordered multilayer arrays and increased their thermal stability in films formed from lipids with reduced cholesterol content. These effects were produced by a concentration of anesthetic that was lower than that required to disorder the films and was pH dependent. The authors concluded that local anesthetics can either stabilize or disorder lipid films depending on the lipid, the concentration of the anesthetic, and the pH of the bathing solution. Local anesthetics may prevent the transmission of nerve impulses when they stabilize lipid bilayers and promote thermal stability.
[8 figures, 28 references] SW

0.5 ECOLOGY OF VIBRIO PARAHAEMOLYTICUS IN CHESAPEAKE BAY

Kaneko, Tatsuo, and Rita R. Colwell (Dept. of Biology, Georgetown University, Washington, DC 20007)
Journal of Bacteriology 113, No. 1, 24-32 (Jan. 1973)

The purpose of this study was to determine the ecological niche of V. parahaemolyticus in Chesapeake Bay in the natural environment; its habitat and role were examined in the natural cycles of plankton, water, and sediment. In addition, the mechanisms whereby the organism survives the winter were studied. Samples were collected monthly from Dec. 1970 to Aug. 1971 at the Rhode River area in Chesapeake Bay. Bottom sediment, water, and plankton samples were collected.

The incidence of V. parahaemolyticus (and related vibrios) correlated with water temperature; the organisms could not be detected in the water column during the winter months, but they were present in the sediment. From late spring to early summer (water temperatures 14°±1° C.) the vibrios that over-wintered in the sediment were released from the bottom communities, attached themselves to the zooplankton, and proliferated as the temperature of the water rose. The temperature of the water column in the range of 14° to 19° C. seemed to be critical in the annual cycle of the vibrios.

Bacterial counts of zooplankton were temperature dependent. The bacterial population associated with the zooplankton was found predominantly on the external surfaces. Furthermore, this bacterial population was different from that of the sediment. The Vibrio spp. and related organisms comprised nearly the total bacterial population associated with the zooplankton during the midsummer months.

(over)

0.5 (2.3) CLOSTRIDIUM BOTULINUM AND SMOKED FISH PRODUCTION: 1963-1972

Pace, Paul J., and Edward R. Krumbiegel (City of Milwaukee Health Dept. 841 N. Broadway, Milwaukee, WI 53202)
Journal of Milk and Food Technology 36, No. 1, 42-49 (Jan. 1973)

Three conditions must exist for botulism to occur: (1) the spores must be present in the environment and gain access to the food, (2) viable spores must remain in the food after processing, and (3) the food must be exposed to conditions that permit germination and subsequent production of toxin. Smoked fish was produced in the Great Lakes area for about 75 years before the first case of human botulism arising from ingestion of such fish was recognized and reported. It appears that processing and distributing practices may have been altered some time about 1960. The smoked fish prepared in the last 10 to 15 years may have had lower salt levels and higher moisture contents than that processed previously. Survey studies conducted since 1963 demonstrated that type E was the most prevalent toxin type in fish and environmental samples from the area. Toxin types A and C, and nonproteolytic type B, were found only occasionally in fish from the Great Lakes. Considerable research has been carried out on the physiology of C. botulinum type E and its spore form, and on practical inoculated pack studies. The authors reviewed these research data and collated them with data derived from studies designed to evaluate the Milwaukee Smoked Fish Ordnance. Both groups of data apparently sustained the validity of the Milwaukee Ordnance.
[1 table, 61 references]

FTP

0.5 (2.3) PUBLIC HEALTH PROBLEMS ASSOCIATED WITH BARBECUED FOOD. A REVIEW

Todd, E., and H. Pivnick (Food Research Laboratories, Health Protection Branch, Ottawa KIA OL2, Ontario, Canada)
Journal of Milk and Food Technology 36, No. 1, 1-18 (Jan. 1973)

Barbecued foods are ready-to-eat products sold in grocery stores, restaurants, take-out shops, and outdoor stalls. Barbecued foods have caused 62 known outbreaks of food poisoning throughout the world. Freshly barbecued foods, adequately cooked, contain few bacteria, but subsequent handling and storage in inadequate holding facilities increases the risk of bacterial contamination. The authors consider temperature control as the best way of preventing food poisoning from barbecued foods. They recommend that barbecued food should be stored at ≤40° or ≥140° F.
[10 tables, 94 references]

FTP

0.5 (0.4) VIBRIO PARAHAEMOLYTICUS METHODOLOGY FOR ISOLATION FROM SEAFOODS AND EPIDEMIC SPECIMENS

Fishbein, Morris, and Barry Wentz (Div. of Microbiology, Bureau of Foods, Food and Drug Administration, Washington, DC 20204)
Journal of Milk and Food Technology 36, No. 2, 118-123 (Feb. 1973)

The identity of V. parahaemolyticus was established in 1963. The organism is a halophilic, enteropathogenic, gram-negative, facultative anaerobe inhabiting most of the oceans. It has been found in many species of fish, crustaceans, and shellfish harvested on all coasts of the United States. A succession of four foodborne outbreaks of V. parahaemolyticus occurred in Maryland after consumption of steamed crab and crab salad in 1971. The organism was isolated from contaminated food and recovered from patients. In Japan, it is the major bacterial cause of epidemic gastroenteritis.

A newly revised procedure in the bacteriological analytical manual of the Food and Drug Administration for the analysis of seafood samples and epidemic specimens was developed for the isolation and identification of this organism. A 50-gram sample of seafood plus 450 ml. of 3% NaCl are blended serially and diluted. Epidemic specimens may be prepared in the same manner or dispersed in Cary-Blair transport medium. The seafood dilutions are inoculated into glucose salt Teepol broth and incubated overnight at 35° C. On the second day, the three highest dilutions showing growth are streaked onto thiosulfate-citrate-bile salts-sucrose agar (TCBS). The plates are incubated overnight at 35° C. The growth on the plates or the epidemic specimen growth in TCBS is inoculated into triple sugar iron agar (TSI), motility agar, trypticase soy agar, and trypticase soy broth.

(over)

0.5 DISTRIBUTION OF VIBRIO PARAHAEMOLYTICUS IN THE NATURAL ENVIRONMENT

Liston, J. (Institute for Food Science and Technology, College of Fisheries, University of Washington, Seattle, WA 98195), and J. Baross
Journal of Milk and Food Technology 36, No. 2, 113-117 (Feb. 1973)

The principal source of V. parahaemolyticus is the sea. It has been isolated from patients ill with gastroenteritis after eating uncooked or lightly processed fish and shellfish. It has been identified as the cause of disease in crabs, shrimp, oysters, and fish.

The organism is most abundant in inshore and estuarine areas where temperatures rise seasonally to levels that permit growth of the organism. Studies in Japan and the United States of coastal areas have shown a direct relationship between ambient temperature and abundance of the organism; the abundance correlates with the seasonal increase in food poisoning, caused by the organism, in Japan. In North America it is most abundant in shellfish and waters of high-organic content; it has also been found in sediment in inshore areas. Information from market seafood samples indicates very low incidence of the organism on fin fish in Europe and North America. On fresh and frozen shellfish in U.S. markets limited data indicate sporadic high incidence on shrimp, crab meat, oysters, and clams.

The organism is one of a group of phenotypically similar, mildly halophilic, mesophilic vibrios. The group is difficult to separate into clearly distinguishable species, and many types mimic V. parahaemolyticus closely. On genetic analysis organisms which are identical in their biochemical reactions to V. parahaemolyticus have proved to be another species. The authors suggest that all published accounts of the incidence and distribution of the organism should be read with caution.
[5 tables, 36 references] SW

0.5 (0.4)

After incubation and examination, an isolated culture is selected that is composed of gram-negative, poorly flagellated, motile, rod shapes producing an alkiline slant and acid butt on TSI and negative for hydrogen sulfide and gas production. This culture is further examined biochemically. A biochemical profile of the organism is shown. An important test for pathogenicity is the appearance of a specific beta hemolysin on Kanagawa agar. Serotyping the unknown organism can be valuable in epidemiological studies. The antigenic groups of V. parahaemolyticus are presented in table form.

The authors suggest that the multiplicity of tests for identifying the organism should be unified and the data reconciled to one standard test method.
[5 figures, 4 tables, 7 references] SW

Ernst, Robert R. (Castle Co., Rochester, N.Y.)
Chemical Abstracts 78, No. 2, 776w (Jan. 15, 1973)

0.5 MYSTERIES AND MISCONCEPTIONS OF STERILIZATION BY STEAM AND ETHYLENE OXIDE

0.5

Apparently, the ecological role of Vibrio spp., including V. parahaemolyticus, is significant with respect to their ability to digest chitin and in relation to the population dynamics of zooplankton in Chesapeake Bay. The surface of the plankton is coated with its metabolic products which are used for food by the attached bacteria. Because Vibrio spp. are chitinoclastic they can decompose plankton, and the organic material thus released is made available for recycling to the environment. [3 figures, 5 tables, 35 references] FTP

Larsen, Ingvar Lauren (Oregon State Univ., Corvallis, Oreg.)
Chemical Abstracts 77, No. 15, 98385s (Oct. 9, 1972)

0.39 DETERMINATION OF ZINC-65 SPECIFIC ACTIVITY IN VARIOUS TISSUES OF THE CALIFORNIA SEA MUSSEL, MYTILUS CALIFORNIANUS (1.88)

0.7 EVALUATION OF LINEAR PROGRAMMING TECHNIQUES IN FORMULATING HUMAN DIETS WITH RAT-FEEDING TESTS

Wilcke, H. L., D. T. Hopkins, L. F. Reutzel, and L. W. Declue (Central Research, Ralston Purina Company, St. Louis, MO 63188)
Journal of Nutrition 103, No. 2, 179-188 (Feb. 1973)

Diets in which the chief source of calories was either rice or wheat were formulated by linear programming to meet the requirements of the preschool child for energy, protein and amino acids. Chicken, fish, beef, eggs, whole milk, soy flour and amino acids were used to supplement the cereals to provide the necessary levels of protein and amino acids. Control diets based on egg protein and glucose were formulated to either satisfy or provide an excess above these requirements. The diets were compared in rat feeding tests. Rats fed diets based on wheat supplemented with intact protein or the amino acids lysine and methionine grew at a rate similar to those fed the control diets formulated to just meet the requirements. Rats fed diets based on rice supplemented with intact protein grew at a rate considerably faster than the control diet and also made comparatively faster growth than those fed the wheat diets. The studies indicate that linear programming can be used successfully to formulate human diets based on wheat. However, due to insufficient information on the nutritive value of rice and on the correlation between analytical and nutritive value of rice for humans, linear programming of diets based on rice was not completely successful as measured by uniformity of results. Requirements can be met by fortification of wheat with lysine and possibly methionine with no additional intact protein whereas fortification of rice with lysine alone is not satisfactory.
[9 tables, 17 references] Authors' abstract

0.7 (7.42) CHROMIUM IN FOODS IN RELATION TO BIOLOGICAL ACTIVITY

Toepfer, Edward W., Walter Mertz, Edward E. Roginski, and Marilyn M. Polansky (Nutrition Institute, Agricultural Research Service, U.S. Dept. of Agriculture, Beltsville, MD 20705)
Journal of Agricultural and Food Chemistry 21, No. 1, 69-73 (Jan.-Feb. 1973)

This paper reports on the chromium analyses of selected food samples and on the biological activity of chromium extracts of these foods. The food items were obtained from local sources. The samples were hydrolyzed with hydrochloric acid or extracted with 50% ethyl alcohol. A modified colorimetric procedure for chromate [J. A. Dean and M. L. Beverly, Anal. Chem. 30, 977 (1958)] was used for chromium analyses. The relative biological activity of the extracts was evaluated by measuring the carbon dioxide produced from glucose oxidation using glucose-1-^{14}C in the presence of rat epididymal tissue and 100 microunits of insulin [W. Mertz, Physiol. Rev. 49, 163 (1969); and E. E. Roginski, E. W. Toepfer, M. M. Polansky, and W. Mertz, Fed. Proc. Abstr. 695 (1970)].

No significant relationship existed between total chromium and biological activity. A significant relationship existed for chromium in the alcohol extracts of meats, fungi, seeds, and seafoods (fruits and vegetables were not included in these tests). The authors proposed an evaluation of the foods based on these data. Data on the calculated chromium biological values of some of the foods tested are shown in the table that follows.

(over)

0.7 (5.124) EFFECT OF PROTEIN AND METHIONINE ON VITAMIN A LIVER STORAGE IN RATS FED DDT

Young, M. L., G. V. Mitchell, and C. R. Seward (Division of Nutrition, Food and Drug Administration, Dept. of Health, Education and Welfare, Washington, DC 20204)
Journal of Nutrition 103, No. 2, 218-224 (Feb. 1973)

The interrelationships among dietary protein, DDT, vitamin A, and DL-methionine were investigated in male weanling Holtzman rats fed purified diets, with either casein or soybean isolate as the protein source, for 4 weeks. Each protein was fed in the basal diet at a level of 10 or 20% with the following variation: A) basal, B) basal + 0.4% DL-methionine, C) basal + 200 ppm DDT, and D) basal + 0.4% DL-methionine + 200 ppm DDT. At the level of either 10 or 20% soy protein, DDT decreased the storage of vitamin A in the liver by 32%; the addition of methionine did not counteract this effect. At the 20% level of casein, storage of vitamin A in the liver was decreased 42% in rats fed DDT; however, in rats fed methionine plus DDT, there was only a 16% decrease in liver vitamin A as compared with the control rats (basal diet A). Methionine caused a significant increase in the amount of DDT, DDE, and DDD stored in the liver when given with either level of soy or with the 10% level of casein; at the 20% level of casein, methionine had no effect. These studies demonstrate that the degree of toxicological stress due to DDT exposure depends in large measure on the quality and quantity of dietary protein. [5 tables, 22 references] Author's abstract

0.7 (0.4) THE TWO FACES OF SELENIUM -- CAN SELENOPHOBIA BE CURED?

Frost, Douglas V. (Nutrition Biochemistry, Brattleboro, VT 05301)
Critical Reviews in Toxicology 1, Issue 4, 467-514 (Oct. 1972)

Selenium (Se) is the most toxic but least plentiful of the nutrients in the earth's crust. It has two faces: the one, good--selenium is nutritionally important, having biological activity similar to that of tocopherols, and the other, bad--selenium in excess is poisonous to animals. Several decades ago a research study on rats seemed to implicate selenium as a carcinogen. The interpretation of this one study study stood without challenge until the 1960's. The present review gives particular attention to the fact that Se was not initially shown to cause cancer, and that claims for the induction of cancer by Se seem to be unsupported by critical evidence. Also, a brief review is given of the toxicity of selenium.

The author believes that the good face of selenium may prove to be of great importance. Further testing must be carried out to determine the relation of Se to inhibition of cancer, to aging, and to susceptibility to coronary disease and sudden death. The possible value of Se for any of these aspects depends upon the supportive effects of vitamin E, or of those antioxidants that mimic its antioxidant effects. The author points out in this review that certain unwarranted apprehensions and preconceptions about Se appear now to be diametrically opposed to the nutritional and biochemical facts. Eventually, as proof of the fundamental

(over)

1.0152 A MARINE BIOLOGICAL SURVEY OF SOUTHERN TAIWAN WITH EMPHASIS ON CORALS AND FISHES

Jones, Robert S., Richard H. Randall, Ying-min Cheng, Harry T. Kami, and Shiu-man Mak
Special Publication No. 1, Institute of Oceanography, College of Science, National Taiwan University, Taipei, Taiwan, Republic of China (1972), 93 pp. Price not given.

This survey covers the southern tip of the island, about 60 kilometers of shallow benthic habitats from Hai-k'ou on the west coast around the southern tip of the island at O-luan-pi and northward along the east coast to Ch'u-feng-pi. This report is divided into two parts. The first part is a general survey of benthic communities, reef development features, shoreline features, and the limits of a recently discovered crown-of-thorns starfish Acanthaster planci (L.) infestation. The second part describes the collection of corals and fishes and includes a series of density observations on the Acanthaster population.
[38 figures, 5 tables, 46 references] FTP

0.7 (0.4)

nutrient value of Se develops, many uses for selenicals in preventive medicine, or possibly even in foods, may arise.

Various study approaches are recommended to achieve the proper understanding relative to Se, as follows: (1) Test the nutritional value of levels of selenite Se, from marked deficiency to maximum tolerated level, against all types of cancer induction. (2) Explore further the validity of the indication that a low exposure to Se in foods and in the environment is reflected in lower blood and tissue levels of Se and that this deficiency increases susceptibility to cancer and to heart and circulatory problems. (3) Establish whether exposure to heavy metal (Pb, Hg, Cd, and Ni) increases signs of Se deficiency in animals on marginal Se diets. (4) Find out whether increase in acidification of waters and soils by SO_2 and NO_2 tends to decrease Se availability and Se uptake by plants. (5) Develop animal models to test whether combined Se-vitamin E deficiency causes sudden death. Once it is accepted that the safe uses of selenicals offer great promise against disease, new research horizons can emerge in nutrition, preventive medicine, and public health.

[4 figures, 4 tables, 267 references] FTP

1.82 (1.01113) THE CLAM FISHERIES OF BRITISH COLUMBIA

Quayle, D. B., and N. Bourne (Fisheries Research Board of Canada Biological Station, Nainaimo, British Columbia, Canada)
Bulletin No. 179, 70 pp. (1972). Fisheries Research Board of Canada, Information Canada, Ottawa, K1A 0S9, Canada. Price $3.00.

The clam harvest is not large but is important to communities along the coast of British Columbia. The value of landings has been up to $220,000 annually, and as much as 8 million pounds have been harvested annually. The fishery is declining, however, because of over harvesting. The most important species taken is the butter clam; three other species are commonly taken also.

This bulletin will be attractive to those interested in clams and the clam industry. Some of the highlights follow, beginning with the biology of the clam. Pollution and toxicity of clams are described with emphasis on conditions on the beaches of British Columbia. Paralytic shellfish poison and detoxification methods are covered in relation to legal requirements. A history of the clam fishery is presented--before 1900 and after--with descriptions of canneries and fishing methods. In addition to the butter clam, the littleneck, Manila, and razor clam are taken. The regulations regarding harvesting are included for these species also. The results of a deepwater clam survey are provided. Details of mechanical harvestors are covered. A list of suggested reading is given for further study. The bulletin is fully illustrated with photographs, diagrams, and maps.

SW

0.7 (7.42)

Food sample (edible portion as selected)	Relative chromium biological value	Food sample (edible portion as selected)	Relative chromium biological value
Yeast, Brewers (dried)	44.88	Shrimp	2.03
Liver, calf's	4.52	Grits	1.97
Cheese, American	4.39	Lobster	1.95
Bread, whole wheat	3.59	Chicken leg	1.89
Beef round	2.89	Haddock	1.86
Oysters	2.43	Chicken breast	1.75
Cornmeal, yellow	2.35	Skimmed milk	1.59

[1 figure, 2 tables, 6 references] FTP

0.8 (9.19) BACTERIA: FRIENDS OR FOES?

Woods, George A. (Betz Laboratories, Inc., Somerton Rd., Trevose, PA 19047)
Chemical Engineering 80, No. 6, 81-84 (Mar. 5, 1973)

Bacteria can cause problems in water supplies, especially in wells and pipelines. Bacteria are also useful in reducing sewage volume and deactivating harmful chemicals. When bacteria are the cause of troubles in water systems the symptoms may appear to be due to other causes. Careful analysis is required to determine the cause of the problems. In an industrial water supply, the plugging of a filter with elemental sulfur was attributed to leakage from nearby tanks containing high-sulfur crude oil. More careful analysis revealed that the sulfur in the blocked filter was due to the presence of sulfur bacteria, Thiobacillus thioxidans. To eliminate the extensive contamination of this water supply, 1 ton of chlorine was required. Other bacteria can plug a water supply by forming deposits of ferric hydroxide on the walls of pipes. Corrosion in a water system can be caused by sulfate-reducing or sulfide-forming bacteria.

A control program is required to determine the causative factors of water system problems and also the corrective action to be taken. If the problems are caused by microorganisms then the correct choice of a biocide must be made. Identification of the organism by proper techniques will assist in determining the chemicals to destroy it.

[4 photographs, 2 tables, 10 references] SW

1.93 THE PACIFIC RIDLEY TURTLE IN JAPANESE AND ADJACENT WATERS

Nishimura, Saburo, Kazuo Shirai, Takeshi Tatsuki, and Chiyota Sugihara
Publications of the Seto Marine Biological Laboratory 19, No. 6, 415-426 (Mar. 1972)

Taxonomy of sea turtles of the tribe Carettini Zangerl 1958 (family Cheloniidae) was uncertain until 1967 when the loggerhead turtle, Caretta caretta (L.) and the Pacific Ridley turtle, Lepidochelys olivacea (Eschscholtz) were distinguished from each other. The occurrence of each turtle in Japanese waters began to be recorded separately also in that year.

Since 1967 the author and his collaborators have been searching for records of occurrence of the Pacific Ridley turtle in order to establish distribution patterns in the western Pacific. The conclusions to be gathered from the records are (1) the Ridley turtle is not normally found in Japanese waters nor in the East China Sea; (2) its native area is in more southerly waters; (3) its two seasons of occurrence in the East China Sea represent periods of northward drift from the native area and return to southerly waters; and (4) the northward drift coincides with the seasonal hydrographic pattern in the East China Sea.

The native area of the Ridley turtle is the South China Sea. Other reports indicate an abundance of the turtles there, and off the coasts of Indochina, Malay Peninsula, and Borneo. This turtle is not confined to these areas, but ventures into offshore waters and long-term drifts. The populations of Ridley turtles in the waters of the West Indies and the Guyanas are considered to be colonies descended from individuals that have drifted from West Africa.

(over)

2.1471 STUDY ON THE HYDRODYNAMIC PROPERTIES OF MID-WATER TRAWL--II.

Chow, Yau-Shou, Wei-Cheng Su, and Chuan-Hong Ho (Fisheries Dept., Taiwan Provincial College of Marine and Oceanic Technology)
Journal of the Fisheries Society of Taiwan 1, No. 2, 41-53 (Sept. 1972) [In Chinese; abstract, figures, and tables in English]

The authors designed and tested midwater trawl nets similar to the 440 Cobb pelagic trawl net (used in the United States) in order to introduce the use of the midwater trawl net on Taiwan otter trawlers. The nets turned out to be suitable for use in Taiwan commercial trawlers.
[21 figures, 3 tables, 12 references] FTP

2.00 STUDIES ON THE VARIATION OF THE FRESHNESS OF FISHES DURING THE STORAGE IN ICE

Jung, Hyung Gyoo, Sang Kwan Rhee, Dong Suk Jang, and Hong Jo Bak
Bulletin of the Fisheries Research & Development Agency No. 9, 85-93 (July 1972) [In Korean; abstract and tables in English]

Porgy (Pogrosomus major), pomfret (Stromateoides orgenteus Euphrasen), swellfish (Sporceroides pardalis Temminck & Schlegel, bastard (Paralichthys olivaceus Temminck & Schlegel), and shrimp (Penaeus monodomj) were stored in ice and were examined at periodic intervals until they became spoiled. Quality of the fish was determined by organoleptic tests and by objective tests for volatile base nitrogen, trimethylamine, and bacterial plate count. The organoleptic quality ratings, consisted of excellent, very good, good, slightly good, average, slightly poor, poor, and very poor.

The fish reached the slightly poor rating after 14 days for porgy, 11 days for pomfret, 10 days for swellfish, 18 days for bastard, and 7 days for shrimp. The results of the objective tests on the various species for the slightly poor state of quality are shown in the table that follows.

(over)

2.1471 THE CATCHING EFFICIENCIES OF A 21.3-METER (HEADROPE) STANDARD WING TRAWL AND A 21.3-METER ELECTRICAL WING TRAWL IN THE SAGINAW BAY AREA OF LAKE HURON

Ellis, James E. (National Marine Fisheries Service, NOAA, Fish Farming Development Center, Rohwer, AR 71666), and Edward N. Pickering
Transactions of the American Fisheries Society 102, No. 1, 116-120 (Jan. 1973)

Studies were conducted to determine the catching efficiencies of electrified bottom trawls. In the study, the voltage gradients in the electrical trawl were determined, and the catch rates were compared to a standard trawl. Similar 21.3 m. (headrope) wing trawls were used for the standard trawl and the electrical trawl. The array of electrodes on the electrical trawl were vertical open panels spaced 1.5 m. apart and parallel to each other and positioned across the mouth of the trawl. The cathodes were located forward of the anodes. The shipboard power supply and a pulser fed the electrodes four 1-msec. pulses per second at 90 volts d.c. (anode to cathode voltage).

Measurements of the electrical field gradients showed an average voltage drop from 21.1 volts within 38.1 cm. of the cathodes to about 1.0 volt midway between the cathodes and anodes and then increased to 16.9 volts within 38.1 cm. of the anodes.

The standard trawl catch average was 40.4 kg. of fish per drag. The electrical trawl--with power on--average catch was 33.3 kg. of fish per drag; with power off, the average catch was 20.1 kg. per drag. The number of fish caught by standard trawl was greater than the catch made by electrical trawl with power

(over)

2.00

Species	Values at the slightly poor state of quality		
	Volatile base nitrogen	Trimethyl-amine	Plate count at 20° C. (muscle)
	mg.%	mg.%	Bacteria/g.
Porgy	20	2 - 3	2.2×10^3
Pomfret	20 - 25	3 - 4	750×10^3
Swellfish	20 - 25	3 - 4	($1,800\times10^3$ to ($11,000\times10^3$
Bastard Shrimp	20 and >	3	43×10^3
	20 and >	3 and >	$1,000\times10^3$

[8 tables, 11 references] FTP

0.8 REMOVAL OF ODOURS BY CATALYTIC INCINERATION (9.19)

Searles, R. A.
Envir. Pollut. Mgmt. 2, No. 7, 280-281, 283-284 (1972)
FOOD R.A. ABSTRACTS 26, No. 1, Abstract No. 197, 32 (Jan. 1973)

The use of a platinum catalyst suspended on a ceramic honeycomb for the oxidation of odorous chemicals is described. Operating costs for catalytic incineration and direct flame incineration are compared. D.B. Reprinted

---

1.93

The Ridley turtles that have been recorded in Japanese waters are considered to be subadult (based on length of carapace). The carapace of the mature Ridley turtle is 66 to 71 cm. long. The majority of those found in Japanese waters measured 45 to 58 cm. in carapace length. The ultimate fate of these turtles will be to continue drifting and perish in the barren central Pacific or become stranded on the west coast of Honshu Island.
[8 figures, 2 tables, 20 references] SW

2.119 FATAL POISONING AND OTHER HEALTH HAZARDS CONNECTED WITH INDUSTRIAL FISHING

Dalgaard, J. B., F. Denckér, B. Fallentin, P. Hansen, B. Kaempe, J. Steensberg, and P. Wilhardt (Inst. Forensic Med., Univ. Aarhus, Aarhus, Denmark)
Chemical Abstracts 78, No. 2, 7398e (Jan. 15, 1973)

2.1471

on or off. The occurrence of species was about the same for either trawls, with carp dominating the catches, and alewife next in number. An interesting result of the catch study was that the mean length of carp, alewife, smelt, and yellow perch was larger in electrical trawls with power on than standard trawls, and standard trawl catches averaged greater length than electrical gear with power off.

The authors suggest that visual and tactile stimuli influence fish in avoiding trawling gear, and the electrical array was influential in their avoidance reaction. They further suggest that electrical array designs should be investigated which will give a uniform electrical gradient and offer less visual stimulus to fish.
[2 figures, 3 tables, 9 references] SW

2.143 FISH HARVESTING METHOD AND APPARATUS (0.8)

Moise, John R. (115 Central Ave., Houma, LA 70360) (pat.)
U.S. Patent 3,714,729 (Feb. 6, 1973)

This invention consists of a frame assembly which may be supported on the bottom of a shallow depth of water to harvest catfish or crayfish or may be supported from the deck of a fishing vessel in deep water to collect fish or other marine animals. The fish are herded into a central collection zone by use of an electric field. FTP

2.1471 EXPERIMENTAL STUDIES ON THE MECHANICAL PROPERTIES OF TRAWL NET

Lee, Tsann-Jan (Taiwan Fisheries Research Institute)
Journal of the Fisheries Society of Taiwan 1, No. 2, 54-65 (Sept. 1972) [In English; abstract in Chinese]

This work dealt with the deformation of the trawl net under varying conditions. The paper gives a few examples of the construction problems involved and offers suggestions for overcoming them. The influence of the length of the cod end to the length of the head line on the shape and webbing of the net is discussed.
[11 figures, 12 references] FTP

2.1474 SET NET EXPERIMENT WITH MAJOR IMPLICATIONS FOR NEW ZEALAND

Anonymous
Commercial Fishing 11, No. 11, 4, 5, 6 (Nov. 1972) (Trade Publications, Ltd., 1 Emily Place, Auckland 1, New Zealand)

Set nets have been used to catch fish on the Japanese coast for many years. A Japanese and a New Zealand company have formed a joint venture to explore the possibilities of using set nets on the coast of New Zealand.

An experimental set net was installed at a site selected on the basis of the likelihood that it intercepted a route of fish movement. This set net consisted of the fence net and the fish trap. The fence net was anchored on the shore and extended 80 yards into the water at a right angle to the shoreline. At the seaward end of the fence net the fish trap was installed. The trap was 7 fathoms deep, 32 yards long, and 15 yards wide. The net was made of a material called saran. The fence net was 6-inch mesh saran, and the fish trap was made of 3-inch mesh. Saran has a specific gravity of 1.7 which is sufficiently heavy for nets made of the material to sink in water without additional weights.

The net is attached to buoyed wires on the surface; the wires are kept in position by sandbags. In this experimental net 100 sandbags were used, but a commercial-sized set net would be secured by 6,000 sandbags.

The experimental set net was tried in three locations along the coast not far from Whitianga, the nearest freeze-processing plant. The catches averaged two to three baskets of fish per day.

(over)

3.19 (1.85) ECONOMIC AND TECHNOLOGICAL STUDY OF THE IRRADIATION OF SHRIMPS (CRANGON VULGARIS FABR.)

Hovart, P., P. Schietecatte, and W. Vyncke
Eurisotop Office Information Booklet 70 (Series Monographies - 19), 165 pp. (Sept. 1972). Published by the Eurisotop Office, Information and Documentation Service, Rue de la Loi 200, B - 1040, Brussels, Belgium)

Shrimp landings accounted for a high proportion of the total landings of shellfish in the European Economic Community (EEC) which included, before 1973, Belgium, France, Netherlands, and West Germany. The value of shrimp landed in these four countries in 1969 was $11,786,000. Shrimping is carried on off the coasts of the member EEC nations, and it is of economic importance to the local regions involved.

The problem of maintaining the quality of shrimp flesh is related to several factors. The composition of the flesh is as follows: average water, 70%; salt, 4%; protein, 23%; fat, 2%; and carbohydrates, 1%. The presence of moisture, protein, and carbohydrate is favorable for the growth of microorganisms. The amount of extractable nitrogen compounds in shrimp flesh are more than twice as much as in fish flesh. Uncooked shrimp contains proteolytic enzymes which appear to be more active than those in fish flesh. Cooking shrimp at temperatures of at least 100° C. for a sufficient time inactivates the enzymes and reduces the bacterial count materially. Most of the cooking is performed on the shrimping vessels at sea. To maintain the quality, refrigeration after cooking the shrimp is necessary. The possibilities of spoilage by microorganisms are numerous throughout

(over)

3.12 STUDIES ON CURING OF MEAT PRODUCTS--II. DEGRADATION OF NITRATE AND NITRITE DURING MEAT CURING

Mori, Kazuo, Yasuo Yamamoto, Yoshiaki Akahane, and Suekazu Oyabu (Nippon Shinyaku Co., Ltd., Food Research Institute, Kyoto, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 38, No. 12, 1383-1390 (Dec. 1972) [In Japanese; figures, tables, and abstract in English]

The influence of certain additives and of heat on the development of color was examined in tuna, whale, and pork meats cured with nitrate and nitrite. In nitrate-cured meat, the addition of phosphate and sucrose accelerated the reduction of nitrate to nitrite. In nitrite-cured meat the addition of phosphate and sucrose resulted in a high level of residual nitrite and the poor development of the desirable cured meat color. Ascorbic acid, sodium ascorbate, and cysteine inhibited the reduction of nitrate to nitrite; thus, a low level of residual nitrite resulted in the good development of cured meat color.

Heating the cured meat resulted in a rapid decrease of nitrite due to the reaction of nitric oxide with myoglobin. However, once the protein had become denatured, there was a steady and large decrease in the level of residual nitrite, probably due to the reaction of nitrite with free amino groups.

The degradation process of nitrate and nitrite in cured tuna, whale, and pork meats differs; however, further research is needed to determine whether the differences are species specific.
[4 figures, 3 tables, 31 references] FTP

3.2340 (8.8) THIOBARBITURIC ACID VALUE, TOTAL LONG-CHAIN FREE FATTY ACIDS, AND FLAVOR OF PACIFIC HALIBUT (HIPPOGLOSSUS STENOLEPIS) AND CHINOOK SALMON (ONCORHYNCHUS TSHAWYTSCHA) FROZEN AT SEA

Botta, J. R., J. F. Richards (Dept. of Food Science, University of British Columbia, Vancouver, Canada), and N. Tomlinson (Fisheries Research Board of Canada, Vancouver Laboratory, Vancouver 8, B.C.)
Journal of the Fisheries Research Board of Canada 30, No. 1, 63-69 (Jan. 1973)

The purpose of this study was to determine the effects of brine-freezing and plate-freezing at sea and subsequent frozen storage of Pacific halibut and chinook salmon upon their 2-thiobarbituric acid (TBA) values, flesh content of long-chain free fatty acids (FFA), and flavor. One lot of in-rigor fish of each species was frozen in a plate freezer at -30° C. for 3.5 hr.; another lot of each species was frozen in a 13% salt (NaCl) solution at -5.6° C. for 9.5 hr. for the salmon and for 47 hr. for the halibut. The frozen fish were then glazed using an ice-water mixture, packaged in polyethylene, and stored at -30° C. The chemical and organoleptic analyses were carried out on both the outside portion and the inside portion of the muscle. The halibut was stored 81 weeks and the salmon 77 weeks. Examinations were carried out at periodic intervals of storage.

The samples of outside muscle of the brine-frozen fish generally had higher TBA values than did the plate-frozen samples; the differences were most pronounced at intermediate storage times (26-45 weeks). The total FFA level was significantly greater in the plate-frozen samples than in the brine-frozen samples of halibut. In both the halibut and salmon, the FFA level was significantly

(over)

3.12 FISH PROCESSING

Fukumoto, J. (pat.)
Japanese Patent 4720362 [sic]
Food Technology 27, No. 3, 92 (Mar. 1973)

Frozen fish and shellfish are thawed and then treated with a solution containing an acid stable protease, that may be mixed with ribonuclease. The treatment prevents odor formation during cold storage of the fish. FTP

3.12 ON THE EFFECTIVENESS OF EDTA IN PROLONGING THE SHELF LIFE OF FRESH FISH

Kuusi, T., and Löytömaki, M.
Z. Lebensmitteluntersuch-Forsch. 149, No. 4, 196-204 (1972) (In German; English summary)
Food R.A. Abstracts 26, No. 1, Abstract No. 135, 23 (Jan. 1973)

It was found that EDTA had a markedly favourable effect on the keeping quality of fresh fish. C.S.B. Reprinted

---

3.2340 (8.8)

greater in the outside muscle than in the inside muscle. The total FFA level for both species significantly increased with length of frozen storage.

At intermediate storage times for both species, significant flavor differences existed between the brine-frozen and plate-frozen samples of outside muscle. For inside muscle of halibut, the significance of flavor differences increased with storage time. For inside muscle of salmon, flavor differences were consistently nonsignificant.

Taste panel results and TBA values of the outside muscle of both Pacific halibut and chinook salmon showed that the plate-frozen samples were preferred to the brine-frozen samples at the first sampling period (9 or 14 weeks), but this preference declined as storage time increased until at later sampling periods the brine-frozen samples were preferred.
[4 figures, 4 tables, 18 references] FTP

3.239 CHANGES IN THE FLESH LIPIDS OF FISH DURING FREEZE STORAGE. III. RELATION BETWEEN RANCIDITY IN FISH FLESH AND PROTEIN EXTRACTABILITY

Takama, Kozo, Koichi Zama, and Hisano Igarashi (Fac. Fish., Hokkaido Univ., Hakodate, Japan)
Chemical Abstracts 77, No. 15, 99745w (Oct. 9, 1972)

2.1471

To find the successful location of a set net, the swimming route of fish must be established by trial and error. The net is then set across the route. The fence net section guides the fish away from the shore into the fish trap. Fish swimming in one direction are caught in this manner, but nets can be set to trap fish swimming in two directions.

To obtain fish from the trap, it is raised to capture the fish. Then they are lifted out of the net into applicable vessels.

The advantages of the set net are as follows: (1) They are less expensive to purchase and maintain than a fishing boat; (2) part-time or full-time local labor is required, and they do not need to be housed or fed as in a boat; (3) undersized or unwanted fish are not killed as by trawling; and (4) the net is stationary; thus, it is always fishing.

The commercial size set net would have a fence net extending 1,000 yds. from shore and would have 12-in. mesh. The fish trap would be 15 fathoms deep, 250 yds. long, 50 yds. wide and the net would be made of 5-in. mesh. The daily catch is expected to be equal to that of a 50-ft. trawler.
[2 photographs, 1 diagram] SW

3.19 (1.85)

the landing and subsequent handling of the shrimp, particularly in the hand peeling operation. The use of shrimp peeling machines would be a great help to the industry.

The use of irradiation to prolong the storage life of shrimp was considered. The technique of radurization, or radiation pasteurization, was found to be the process most applicable to shrimp. Radioisotopes which emit gamma rays and are useful in irradiation of shrimp were found to be Co^{60} and Cs^{137}. In commercial operation a system must be organized where there is an irradiation room in which the source of gamma rays is located; the conveyor system for transporting the product into, through, and out of the irradiation room; biological shielding to prevent injury to personnel; and safety and control systems.

The initial quality of the product must be high, before irradiation, to ensure good storage qualities. In addition, pretreatment, such as blanching or cooking, the packing (with or without vacuum), and the storage temperature are factors affecting the storage life of the product.

The studies showed that the shelf life of shrimp can be extended substantially by irradiation, and the costs are not high. Psychological factors relative to product acceptability may require further study.
[29 figures, 57 tables, 94 references] SW

3.2340 (8.8) FLESH pH, COLOR, THAW DRIP, AND MINERAL CONCENTRATION OF PACIFIC HALIBUT (HIPPOGLOSSUS STENOLEPIS) AND CHINOOK SALMON (ONCORHYNCHUS TSHAWYTSCHA) FROZEN AT SEA

Botta, J. R., J. F. Richards (Dept. of Food Science, University of British Columbia, Vancouver, British Columbia, Canada), and N. Tomlinson (Fisheries Research Board of Canada, Vancouver Laboratory, Vancouver 8, B.C.)
Journal of the Fisheries Research Board of Canada 30, No. 1, 71-77 (Jan. 1973)

The first report on this overall research project was published on pages 63-69 of the same issue of this journal. It dealt with the thiobarbituric acid value, total long-chain free fatty acids, and flavor of Pacific halibut and chinook salmon brine-frozen and plate-frozen at sea. The present study was concerned with the effects of brine-freezing and plate-freezing at sea on flesh pH, color (Hunter a/b ratio), thaw drip, and mineral concentration in the fish (glazed and packaged in polyethylene) stored at -30° C. The brine-frozen fish were frozen in 13% NaCl solution.

The difference in the pH of the flesh of brine-frozen and plate-frozen samples of the halibut and the salmon were not significant; the pH generally declined during storage of the fish.

The changes in the Hunter a/b ratio of the salmon samples were similar for the brine-frozen and the plate-frozen fish, and the ratio generally increased during storage of the fish. The degree of oxidative rancidity was not sufficient to induce measurable fading of pigment.

The thaw drip of the brine-frozen samples of Pacific halibut and chinook salmon stored 9-31 weeks was less than that for the plate-frozen samples; however,

(over)

3.2340 (8.8) FLESH CONCENTRATION OF VARIOUS LONG-CHAIN FREE FATTY ACIDS OF PACIFIC HALIBUT (HIPPOGLOSSUS STENOLEPIS) AND CHINOOK SALMON (ONCORHYNCHUS TSHAWYTSCHA) FROZEN AT SEA

Botta, J. R., and J. F. Richards (Dept. of Food Science, University of British Columbia, Vancouver, British Columbia, Canada), and N. Tomlinson (Fisheries Research Board of Canada, Vancouver Laboratory, Vancouver 8, B.C.)
Journal of the Fisheries Research Board of Canada 30, No. 1, 79-82 (Jan. 1973)

The first two reports on this overall research project were published on pages 63-69 and 79-82 of the same issue of this journal. They dealt with thiobarbituric acid value, total long-chain free fatty acids, flavor, flesh pH, color, thaw drip, and mineral concentration of Pacific halibut and chinook salmon frozen at sea. The present study examined changes in the concentration of individual long-chain free fatty acids and their relationship to flavor differences in the brine-frozen and plate-frozen halibut and chinook salmon frozen at sea and stored 9-81 weeks at -30° C. The brine-frozen fish were frozen in 13% NaCl solution. The frozen samples were glazed and packed in polyethylene bags before storage. The concentrations of long-chain free fatty acids were determined by use of gas chromatography. Samples of flesh from the inside muscle and the outside muscle were examined.

For both species of fish, the level of individual free fatty acids was greater in outside muscle than in the inside muscle. Few differences existed in the concentrations of free fatty acids between the plate-frozen and the brine-frozen samples. The level of many free fatty acids increased during frozen storage of the fish. The increase, in both species of fish, was most rapid during

(over)

3.2495 PARAMETERS OF TEXTURAL CHANGE IN FROZEN-STORED COOKED LOBSTER (HOMARUS AMERICANUS) TAIL MUSCLE

Dagbjartsson, Bjorn, and Myron Solberg (Dept. of Food Science, College of Agriculture & Environmental Science, Rutgers State University, New Brunswick, NJ 08903)
Journal of Food Science 38, No. 2, 242-245 (Feb. 1973)

During frozen storage, changes occur in muscle tissue of mammals and crustaceans which cause toughening. Molecular aggregation and crosslinking of protein chains, or combinations of fatty acids with myofibrillar proteins, or releases of protein insolubilizing enzymes have been suggested as mechanisms causing toughness in the tissues.

A study was performed to evaluate the factors which may be the cause of textural changes in precooked lobster meat during frozen storage. Tail muscles, removed from lobsters boiled in 2.5% NaCl brine at 80°-85° C. for 10 min. and cooled in running water, were sealed in plastic film, quick frozen, and stored at either -12° or -27° C. The muscle tissue was tested, at intervals of several weeks up to a storage time of 50 weeks, for the following characteristics: (1) shear force; (2) pH; (3) water holding capacity (WHC); (4) amount of free sulfhydryl, salt soluble protein, actomyosin free extract, and total extractable protein; (5) shear force relative to pH; and (6) shear force relative to WHC.

The results indicated that the force required to shear the muscle increased with time of storage at either -12° or -27° C. Further, the pH increased slightly with time, and was slightly higher at -12° C. than at -27° C. storage. At -12° C.

(over)

3.27 (3.23) THAWING OF FISH AND FISHERY PRODUCTS

Howing, H. [Houwing]
De Visserijwereld 31, No. 20, 3 pp. (1972) (In Dutch)
World Fisheries Abstracts 23, No. 4, Abstract No. 23-4393, 39-40 (Oct.-Dec. 1972)

In the article are not only advantages and disadvantages of different thawing methods mentioned but also thawing experiments with the A.P.V. vacuum thawing apparatus. This apparatus has been developed in the United Kingdom.

Thawing takes place in a steam-atmosphere at a temperature of about 20° C (68° F). With thawing experiments with herring it has been proved that the herring fats were not odixized. Moreover, the texture of the marinated herring, manufactured of vacuum-thawed herring, was better than those made from brine-thawed herring.

The quality of vacuum-thawed shrimps was very good. The bacterial counts of the shrimps thawed up according to different systems were as follows:

(over)

3.2340 (8.8)

the first 26-45 weeks of storage (-30° C.). The occurrence of flavor differences was not related to the level of individual free fatty acids.
[1 table, 16 references] FTP

3.27 (3.23)

Thawing method	Bacterial count frozen shrimps	Bacterial count thawed shrimps	
		Outside	Centre
Vacuum thawing	1.3×10^5	1.3×10^5	1.3×10^5
Water thawing	1.3×10^5	6.5×10^5	1.3×10^5
Air thawing	1.3×10^5	1.3×10^5	1.3×10^5

Water thawing of frozen shrimp is not only a wrong method because of the higher bacterial count but also because the flavouring compounds are leached out.

Although air thawing is a rather good method from a bacteriological point of view it has the disadvantage of the long thawing time (10 hours) whereas vacuum thawing only takes two hours with the same block dimensions.

Abstracter: H. Houwing

3.25 DO'S AND DON'TS OF REFRIGERATED VEHICLES

Gerrard, F.
Meat Trades J. No. 4399, pp. 14-15 (1972)
BFMIRA Abstracts 25, No. 12, Abstract No. 4458, 543 (Dec. 1972)

The standards laid down by the American Forces for the cooling of meat which is supplied to them, by the Northern Ireland authorities for the cooling and transportation of meat, and by the West German authorities for the cooling of meat are briefly outlined. The recommendations of the International Institute of Refrigeration are also mentioned. The problems of insulation materials for containers and the recent MIR report which covered transportation and cooling of meat are also briefly dealt with. C.C.E.

Reprinted

3.2495

the WHC dropped markedly sooner than at -27° C. Losses in WHC can be attributed to loss of structure in the muscle due to cooking, in addition to the damage caused by freezing. The moisture content remained stable during storage at -12° C. The biochemical and physicochemical characteristics of total extractable protein, salt soluble protein percent, actomyosin free extract percent, and quantity of free sulfhydryl remained relatively unchanged during 30 weeks of storage at either -12° or -27° C. The relation of shear force to pH change was linear in that both increased with time at either storage temperature. In contrast, as the WHC decreased, shear force increased with time at both storage temperatures.

The author suggests that there may be a common factor or factors which cause changes in pH, WHC, and shear force.
[6 figures, 1 table, 28 references] SW

3.2343 (3.2382) A METHOD OF PRODUCTION OF DEEP FROZEN FISH FILLET

Frionor Norsk Frossenfisk A/L, Norway (pat.)
British Patent 1,296,621
Food R.A. Abstracts 26, No. 1, Abstract No. 315, 48 (Jan. 1973)

A method for vacuum packaging deep frozen fish fillet blocks in plastic film is described.

Reprinted

3.2340 (8.8)

after this storage period, the brine-frozen samples had approximately equal (or greater) thaw drip to that of the plate-frozen fish. With the exception of the plate-frozen Pacific halibut the thaw drip tended to increase with length of storage of the fish.

The method of freezing (brine or plate) of the halibut and salmon did not significantly affect the potassium level of the fish. For both species of fish, the sodium and chloride levels of the outside muscle of the brine-frozen fish were at least two to three times greater than that of brine-frozen inside muscle or plate-frozen muscle.
[6 figures, 4 tables, 19 references] FTP

3.4 (3.64)(3.12) PROTECTION OF SMOKE-DRIED FRESHWATER FISH FROM INSECT DAMAGE DURING STORAGE IN ZAMBIA

Proctor, D. L. (Trop. Stored Prod. Cent., Trop. Prod. Inst., Slough/Bucks., England)
Chemical Abstracts 77, No. 17, 112625d (Oct. 23, 1972)

3.33 SOME CONSIDERATIONS ON PRESERVING SHRIMPS (CRANGON VULGARIS)

Houwing, H.
Voedingsmiddelentechnologie 3, No. 17, 24-26 (1972) (In Dutch)
World Fisheries Abstracts 23, No. 4, Abstract No. 23-4413, 41-42 (Oct.-Dec. 1972)

The landed shrimps in Holland are cooked immediately after catch. The bacterial count is reduced to 10^1 - 10^2 per gram. By the next step, i.e., cooling and rinsing in seawater, the bacterial count mounts up to 10^4 - 10^6 per gram.

The bacterial count mainly depends on the quality of the seawater. Undoubtedly, shrimp with such a high bacterial count have a rather short shelf life, even if they are kept cool aboard the ships.

Reduction of the bacterial count by pasteurization may improve the shelf life considerably. In principle shrimps can be pasteurized in two ways, i.e., a hot dip treatment, after the above-mentioned rinsing procedure, during eight seconds, or a pasteurization treatment later on. This treatment can take place either before or after packing.

Pasteurization before packing only results in a good product when it is done in thin layers. A treatment of forty seconds is sufficient and does not change the organoleptic properties. Weight-losses of about 10 per cent occur however.

Pasteurization of packed shrimp gives rather good results by immersing thin packages during five minutes in water of 80°C (176°F).

Abstracter: H. Houwing

4.13 (0.31) SEASONAL AND LOCAL VARIATIONS IN ODD-CHAIN FATTY ACID LEVELS IN NOVA SCOTIAN RAINBOW SMELT (OSMERUS MORDAX)

Addison, R. F. (Fisheries Research Board of Canada, Marine Ecology Laboratory, Bedford Institute of Oceanography, Dartmouth, Nova Scotia, Canada), R. G. Ackman, and J. Hingley (Fisheries Research Board of Canada, Halifax Laboratory, Halifax, Nova Scotia, Canada)
Journal of the Fisheries Research Board of Canada 30, No. 1, 113-115 (Jan. 1973)

Earlier work by the authors showed the unusual occurrence of large amounts of odd-chain fatty acids in the lipids of rainbow smelt from Jeddore Harbour, N.S. It was suggested that this might be a seasonal variation that could be related to the migratory feeding habits of the fish. The present study examined the odd-chain fatty acid levels of the Jeddore smelt from the spring of 1969 to the summer of 1970. The odd-chain fatty acid levels showed a pronounced seasonal variation during the test period. The levels reached a maximum of 20% total fatty acids in the January-March period, and fell to a minimum of about 2% total fatty acids in summer and fall. The variation in the levels was general and occurred in all the odd-chain fatty acids. It appears that the odd-chain fatty acids originated in the diet of the smelt.
[2 figures, 1 table, 6 references]

FTP

3.64 STUDIES ON THE PROCESSING METHOD AND TASTE COMPOUNDS OF DEHYDRATED ALASKA POLLACK (I) CHANGES OF NUCLEOTIDES AND THEIR RELATED COMPOUNDS AND FREE AMINO ACID COMPOSITION OF ALASKA POLLACK DURING HOT-AIR DEHYDRATION

Lee, Eung Ho, Bong Ho Han, Yong Gun Kim, Syng Taek Yang, and Kyung Sam Kim
Bull. Pusan Fish. Coll. 12, No. 1, 25-36 (1972)[6 figures, 3 tables, 24 references]
Korean Scientific Abstracts 4, No. 5, Abstract No. 72/543, 157-158 (Oct. 1972)

Alaska pollock muscle was hot-air dried and then was stored for 3 months. During intervals of storage, the dried fish was analyzed for nucleotides and their related compounds.

The inosine and IMP levels in the defrosted [original] sample of flesh were 13.5 and 5.1 µmole/g. (dry basis); the hypoxanthine level was next highest. The flesh contained low levels of ATP, ADP, and AMP. IMP and inosine degraded rapidly during hot-air drying of the pollock flesh, while the hypoxanthine level increased about fourfold. Changes in the levels of nucleotides and their related compounds were not observed.

Taurine was 40% of the total amino-acid content of the muscle extracts followed by, in decreasing order, alanine, glycine, and glutamic acid. The levels of lysine, serine, and histidine were low; those of valine, aspartic acid, threonine, and leucine were very low. The level of total free amino acids increased by about 20% during hot-air drying of the flesh.

FTP

4.5 (4.60) EFFECTS OF SURFACE CONCENTRATION, METALS AND ACID SYNERGISTS ON AUTOXIDATION OF LINOLEIC ACID MONOLAYERS ON SILICA

Porter, W. L., L. A. Levasseur, and A. S. Henick (Food Laboratory, U.S. Army Natick Laboratories, Natick, MA 01760)
Lipids 7, No. 11, 699-709 (Nov. 1972)

The techniques of F. J. Honn, I. I. Bezman, and B. F. Daubert [JAOCS 28, 129 (1951)] and other workers [J. Amer. Chem. Soc. 90, 6109 (1968) and Photochem. Photobiol. 7, 665 (1968)] were used to study the autoxidation of monolayers of linoleic acid adsorbed from solution onto silica gel as a function of time and α-tocopherol and acid synergist content. The model system was intended to approximate the autoxidation of monomolecular layers of lipids on the cell surfaces of freeze-dried foods. This article reports the effects of metal ions and acid synergists (ascorbic, citric, phosphoric, and polyamino acids) on the autoxidation of linoleic acid in this model system. Gas chromatography was used to follow oxygen disappearance at 80° C.

The oxidation of linoleic acid (without added antioxidant) started at a nearly linear rate without an induction period. On acid-washed silica, about 60 min. were required for consumption of one-half mole of oxygen per mole of linoleic acid. When very small amounts of α-tocopherol were included in the layer of linoleic acid, no measurable amount of oxygen uptake in this system occurred during an induction period; the length of the induction period was about proportional to the tocopherol content. The inflection point at the beginning of the rapid oxidation was sharp, and the oxidation rate following this point was about the same as that of the untreated linoleic acid. The induction period of linoleic acid containing

(over)

3.63 STUDIES ON THE PROCESSING METHOD AND TASTE COMPOUNDS OF DEHYDRATED ALASKA POLLACK (II) SOME METHODS FOR HOT-AIR DEHYDRATION OF ALASKA POLLACK

Lee, Eung Ho, Yong Gun Kim, Syng Taek Yang, Kyung Soon Kim, and Jae Hyung Phyun
Bull. Pusan Fish. Coll. 12, No. 1, 37-43 (1972) [5 figures, 5 tables, 2 references]
Korean Scientific Abstracts 4, No. 5, Abstract No. 72/544, 158 (Oct. 1972)

Round fish or fillets of Alaska pollock that have been hot-air dried are difficult to reconstitute. Therefore, the authors tried a new technique as follows: Chopped Alaska pollock meat was immersed for 30 min. in an alkaline solution containing 0.4% hydrogen peroxide, and then the mixture was agitated for 10 min. The foamy, emulsified meat was spread on a nylon net seated on a metal tray, allowed to drain, and then was dehydrated. A fairly good dried product that could be readily reconstituted was obtained. FTP

3.60 INFLUENCE OF FROZEN STATE REACTIONS ON FREEZE-DRIED FOODS

Karel, Marcus, and James M. Flink (Dept. of Nutrition and Food Science, Massachusetts Institute of Technology, Cambridge, MA 02139)
Journal of Agricultural and Food Chemistry 21, No. 1, 16-21 (Jan.-Feb. 1973)

The quality of freeze-dried foods may be superior to that of food processed by another means, because low drying temperatures are used, the original shape and appearance of the food is retained, and much of the original flavor is retained. Achieving these desirable qualities depends upon the maintenance of the original macroscopic, microscopic, and molecular structure of the food; low drying temperature is only practical if the rate of sublimation is substantial (even at the low temperatures and vapor pressures of ice). The porosity of the dry layer must be high, and no excessive impedance to vapor flow due to collapsing pores or capillaries should exist. The internal structure of the foods should be maintained to preserve the food's shape, texture, and appearance. The formation of microregions where flavor compounds are locked in is required to retain the flavor of the food. Freezing rate, minimum temperature during freezing, and the temperature of the frozen layer during drying affect the reactions that occur during the life of the food product. This article discusses the following aspects of freeze-dried foods: effects of freezing conditions on water binding by freeze-dried foods; effects of freezing on drying behavior; rates of chemical reactions in frozen foods; and effects of freezing and freeze-drying on retention of flavor in foods.
[8 figures, 9 tables, 33 references] FTP

4.5 (4.60)

α-tocopherol was as much as 100% longer when exposed in a monolayer than when exposed in bulk form (containing the same amount of α-tocopherol). The rate of oxidation of the linoleic acid after commencement of rapid oxidation was 8 to 10 times greater in the monolayer than in the bulk form.

The iron content of the silica was reduced by 75% by acid washing. The rate of autoxidation of the linoleic acid (without α-tocopherol) adsorbed on acid washed silica was reduced by 60%; when α-tocopherol was present the length of the induction period was increased fourfold. Pretreatment of the silica by adsorption of acid synergists (ascorbic, citric, phosphoric, and ethylenediaminetetraacetic acid-EDTA) produced an effect similar to that obtained by acid washing the silica. The synergists extended the induction period in increasing order, respectively, as follows: ascorbic acid, phosphoric acid, citric acid, and ethylenediaminetetraacetic acid; the EDTA produced a 100-fold extension. The synergists probably display synergistic effects because of their ability to complex pro-oxidant catalysts (metals) and because of their acid activation of inhibitols (primary antioxidants).
[7 figures, 5 tables, 32 references] FTP

4.15 (8.53) 7-METHYL-7-HEXADECENOIC ACID: ISOLATION FROM LIPIDS OF THE OCEAN SUNFISH MOLA MOLA (LINNAEUS) 1758

Ackman, R. G., L. Safe, S. N. Hooper, and M. Páradis (Fisheries Research Board of Canada, Halifax Laboratory, Halifax, Nova Scotia), and S. Safe (National Research Council of Canada, Atlantic Regional Laboratory, Halifax, N.S.)
Lipids 8, No. 1, 21-24 (Jan. 1973)

The pelagic ocean sunfish is unusual in that it is reputed to feed on jellyfish. In the course of a study of the marine animals originating or accumulating trans-6-hexadecenoic acid, the authors also examined the ocean sunfish. A sample of the species of fish was obtained in waters off Nova Scotia. A fatty acid comprising about several percent of the acids in the liver oil of the sunfish was isolated and characterized as 7-methyl-7-hexadecenoic acid. This acid and 7-methyl-6-hexadecenoic acid (reported earlier) are believed to be chiefly responsible for the 7-methylhexadecanoic acid found in many fatty acid mixtures of marine origin after hydrogenation. The origins and reasons for the specific accumulations in some samples of marine lipids of either or both 7-methyl-6-hexadecenoic acid and 7-methyl-7-hexadecenoic acid are obscure; however, the latter may be linked to the jellyfish forming a part of the diet of the ocean sunfish. trans-6-Hexadecenoic acid has also been found in the jellyfish.
[3 figures, 25 references] FTP

4.5 AUTOXIDATION OF FATTY ACID ESTERS IN THE PRESENCE OF A HEAVY METAL CATALYST "SALCOMINE" (CO[II]-BISSALICYLALETHYLENEDI-IMINE): I. EFFECT OF CATALYST UPON RATE OF CONSUMPTION OF OXYGEN AND DECOMPOSITION OF HYDROPEROXIDE

Jarvi, Pentti K. (University of Helsinki, Helsinki, Finland; Hormel Institute, Austin, MN 55912)
Lipids 7, No. 12, 755-761 (Dec. 1972)

Antioxidative and prooxidative effects were observed during the autoxidation of fatty acid esters in the presence of a heavy metal chelate "salcomine." The induction period becomes shorter and under certain conditions may disappear, when the level of the catalyst is decreased or when the temperature is increased. The decomposition of hydroperoxides is affected by Co(II)-bissalicylalethylenedi-imine; a first order reaction is involved with Arrhenius parameters E = 21,000 cal, and $A = 8.99 \times 10^{10}$ sec.$^{-1}$. Above 30° C., the solubility of oxygen in fatty acid esters, with and without salcomine, is the same.
[6 figures, 1 table, 41 references] FTP

4.92 (5.7) OBSERVATIONS ON THE ROLE OF VITAMIN E IN THE TOXICITY OF OXIDIZED FATS

Privett, O. S., and Reto Cortesi (University of Minnesota, Hormel Institute, Austin, MN 55912)
Lipids 7, No. 12, 780-787 (Dec. 1972)

It is believed that a primary function of vitamin E is its role as a biological antioxidant protecting cells from membrane damage. This study examined the relative effects of in vivo oxidation produced by diets devoid of vitamin E and the consumption of oxidized fat.

Rats (Sprague-Dawley strain) were fed from weaning on a sucrose-casein diet containing minerals and vitamins in the required amounts and supplemented with 10% of safflower oil, menhaden fish oil, hydrogenated coconut oil, or no fat. The rats of about 185 g. from the group fed 10% safflower oil had their diets changed for 4 weeks to a diet containing oxidized safflower oil or oxidized menhaden oil (the oil supplemented diets had been allowed to oxidize by exposing them to room temperature in the dark for 2 to 8 days). Also, for comparative purposes, rats were raised from weaning on similar diets devoid of vitamin E.

Rats fed oxidized fat showed loss of weight, effects on size of their organs, changes in triglyceride levels, and production of thiobarbituric acid-reacting substances in their tissues. No effect was found on the induced swelling of liver mitochondria or the susceptibility of erythrocytes to hemolysis. The animals fed vitamin E free diets showed suppressed growth; in vivo oxidation in these rats produced marked effects on the membrane properties of erythrocytes and liver mitochondria. [5 figures, 4 tables, 42 references] FTP

4.5 AUTOXIDATION OF FATTY ACID ESTERS IN THE PRESENCE OF A HEAVY METAL CATALYST "SALCOMINE" (CO[II]-BISSALICYLALETHYLENEDI-IMINE): II. FORMATION OF A REACTION PRODUCT FROM A PEROXY RADICAL AND SALCOMINE

Jarvi, Pentti K. (University of Helsinki, Helsinki, Finland; Hormel Institute, University of Minnesota, Austin, MN 55912)
Lipids 7, No. 12, 788-792 (Dec. 1972)

The kinetics of the autoxidation and decomposition of hydroperoxides of fatty acid methyl esters with salcomine were described in an earlier report by the author [Lipids 7, No. 12, 755-761 (Dec. 1972)]. In the present study, the formation of ionic Co(II)-bissalicylalethylenedi-imine complexes of peroxy radicals of methyl esters of fatty acids was followed by use of UV spectra. Typical compounds were isolated and purified, and were analyzed for Co content. Their IR spectra were determined.

The combined effects of salcomine upon the autoxidation of fatty acid methyl esters is represented by the following scheme:

(over)

6.32 STUDIES ON THE COMPONENTS OF NAGA-KOMBU, LAMINARIA LONGISSIMA--II. INORGANIC ELEMENTS

Hosoda, Kiichi (Obihiro Ohtani Junior College, Hokkaido, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 38, No. 12, 1405-1409 (Dec. 1972) [In Japanese; tables and abstract in English]

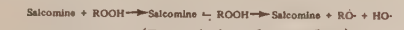
The mineral content of the dried specimens of L. longissima were determined; the data are summarized in the table that follows.

Description of dried samples of Laminaria longissima	Number of samples	Average composition, mg./100 g. on moisture-free basis			
		Calcium	Iron	Magnesium	Iodine
Sei-kombu, mature	5	890	8.03	730	349.8
Saomae-kombu, immature	5	790	17.40	620	152.7
Ascus parts of Sei-kombu	3	740	6.18	570	285.3
Parts of Sei-kombu less ascus parts	3	1070	9.04	860	372.9

[4 tables, 22 references] FTP

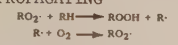
4.5

INITIATING

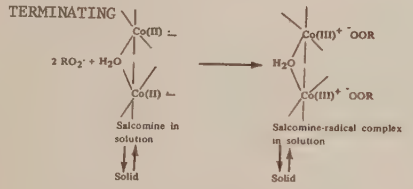


(Transitional complex)

PROPAGATING



TERMINATING



The effect may be further defined as an oxidative addition reaction.
[6 figures, 13 references]

FTP

6.54 (0.7) FURTHER STUDIES ON THE AVAILABILITY OF THE FLUORIDE IN FISH PROTEIN CONCENTRATE

Stillings, B. R., Herta R. Lagally, Elizabeth Zook, and I. Zipkin (College Park Fishery Products Technology Laboratory, National Marine Fisheries Service, NOAA, College Park, MD 20740)
Journal of Nutrition 103, No. 1, 26-35 (Jan. 1973)

In a previously published study using female weanling rats, the fluoride in FPC (fish protein concentrate) was shown to be about 25 to 50% as available as that in sodium fluoride, while in a study using adult male humans the availability of fluoride from the two sources was shown to be nearly the same. The present three experiments were conducted to determine the reasons for these conflicting results. In the first experiment at high intakes of fluoride, the apparent absorption of FPC-fluoride by weanling and adult male rats was 30 to 50%, and the carcass retention was 30 to 60% as high as that of sodium fluoride. The comparative results for weanling and adult rats were similar. In the second experiment at low fluoride intakes, the apparent absorption and carcass retention of fluoride from FPC was similar to that from sodium fluoride. In the third experiment at low fluoride, calcium and phosphorus intakes, the apparent absorption and carcass retentions were higher for both sources of fluoride compared to the previous experiment. These studies showed that the availability and retention of FPC-fluoride were similar to those of sodium fluoride at low fluoride intakes. At high intakes, the availability of FPC-fluoride was less than 50% of that of sodium fluoride. Thus we conclude that the major reason for the differences in the two previously published studies was the level of fluoride intake as well as the level of calcium and phosphorus in the diets.
[1 figure, 6 tables, 12 references]

Authors' abstract

4.5 STUDIES ON THE METAL-PROTEIN COMPLEX. III. RELATIONSHIP BETWEEN THE BINDING ABILITY OF VARIOUS INORGANIC METAL-PROTEIN COMPLEX AND ACTIVITY OF METAL-CATALYZED AUTOXIDATION

Kajimoto, Gorō, and Hiromi Yoshida (Faculty of Nutrition, Kobe Gakuin University, Arise, Ikawadani, Tarumiku, Kobe, Japan)
Journal of the Japan Oil Chemists' Society 21, No. 11, 842-845 (Nov. 1972) [In Japanese; abstract in English]

This paper reports on the relation between the binding ability of inorganic metal (copper, iron, zinc, magnesium)-casein complexes and the activity of metal-catalyzed autoxidation.
[4 figures, 2 tables, 14 references]

FTP

5.2 CHEMISTRY OF THIAMINE DEGRADATION IN FOOD PRODUCTS AND MODEL SYSTEMS: A REVIEW

Dwivedi, Basant K., and Roy G. Arnold (Dept. of Food Science and Technology, University of Nebraska, Lincoln, NE 68503)
Journal of Agricultural and Food Chemistry 21, No. 1, 54-60 (Jan.-Feb. 1973)

This article is a review of the literature dealing with the effects of pH, heat, oxidation-reduction systems, inorganic bases (sulfites, bisulfites), thiaminases, metal complexes, radiation, and ultrasonic waves on the degradation of thiamine in food products and model systems. Also, the nature of the many compounds resulting from the degradation of thiamine is described. Actually, model systems have been mostly employed to determine the nature of thiamine degradation reactions and products. Food systems, because of their complexity, have not been used extensively in such studies.

Thiamine degradation products may contribute to the flavor of heated food systems. For example, some flavor contributing degradation products of thiamine include hydrogen sulfide, 2-methylthiophene, and 2-methylfuran. However, additional information with actual food systems is needed to assess the full significance of thiamine degradation to the flavor of food products.
[94 references]

FTP

4.82 MARINE FAT. DIGESTIBILITY OF ITS FATTY ACIDS IN YOUNG CALVES

Fiatlandsmo, Knut (Dep. Anim. Husb. Genet., Vet. Coll. Norway, Oslo, Norway) Chemical Abstracts 77, No. 17, 112834w (Oct. 23, 1972)

6.35 (6.31) ECOLOGICAL STUDIES OF ECONOMIC RED ALGAE. IV. VARIATIONS OF CARRAGEENAN CONCENTRATIONS AND PROPERTIES IN CHONDRUS CRISPUS STACKHOUSE

Fuller, Stephen W. (New York Ocean Science Laboratory, Montauk, N.Y.), and Arthur C. Mathieson
Journal of Experimental Marine Biology and Ecology 10, No. 1, 49-58 (Oct. 1972)
Published by North-Holland Publishing Co., P.O. Box 211, Amsterdam, Netherlands.

C. crispus (S.) contains the economically important phycocolloid carrageenan. This sulfated polysaccharide is characterized by the following physical properties: gel strength, viscosity, and ratio of major fractions (kappa, lambda, and iota). Carrageenan is economically important because it is used extensively in the food, pharmaceutical, cosmetic, and other industries.

This study was performed to evaluate the relations between the valuable properties of Chondrus and its age, reproduction stage, habitat, and season of harvest.

No correlation was found between gel strength and viscosity. A decrease in viscosity of carrageenan was found after storage of 6 months. Storage did not influence gel strength. Age of the plants, stage of reproduction, and exposure to wave action had no effect on quantity or properties of carrageenan. Sublittoral plants had higher viscosities and concentrations of carrageenan than plants taken from littoral areas; gel strengths were higher in carrageenan from littoral plants than sublittoral plants. Carrageenan concentrations and gel strength were higher in plants taken from coastal regions than from plants in estuarine locations.

(over)

7.42 (9.19) A SURVEY OF MERCURY RESIDUE IN FISH CAUGHT BY TAIWAN'S FISHING VESSELS

Sun, C. T. (Dept. of Food Chemistry, Food Industry Research and Development Institute, National Taiwan University), and W. H. Chang
Journal of the Fisheries Society of Taiwan 1, No. 2, 31-40 (Sept. 1972) (Taipei, Taiwan, China) [In English; abstract in Chinese]

During the period of March 1971 through February 1972, 537 fish samples from 23 different kinds (mostly swordfish and yellowfish tuna) caught by Taiwan's fishing vessels were analyzed for mercury content by means of flameless atomic absorption spectrophotometry. The dark flesh of the fish showed higher levels of mercury than did the light flesh. The mercury level in the flesh correlated directly with the size of the fish--indicating a tendency to accumulate in the body of the fish. Data are given in the table that follows.

(over)

6.54 (3.) PILOT PLANT PRODUCTION OF AND LARGE SCALE ACCEPTANCE TRIALS WITH QUICK SALTED FISH

Del Valle, F. R. (Banco Nacional de México, S.A. Mexico City, Mexico), M. Padilla, A. Ruz, and R. Rodriguez
Journal of Food Science 38, No. 2, 246-250 (Feb. 1973)

The authors have adapted a quick salting process for fish, previously reported [Food Technology 22, 1036 (1968); and Tecnologia de Alimentos 7, No. 1, 12 (1972)], to pilot plant scale. The process consists of grinding pieces of fish flesh with simultaneous addition of salt. The ground, salted meat is pressed into cakes, and the cakes are then sun dried. The amounts of salt added are those necessary to coagulate the protein in the fish flesh, and they vary from 25 to 100% of wet weight. The pressures applied are 120 to 150 kg. per square centimeter (1,700 to 2,100 p.s.i.). The pressing step removes a large proportion of water from the mix; however, protein losses in the press liquor are negligible. In addition, before consumption, the cakes are desalted by leaching twice in boiling water; protein losses in the desalting water are also negligible. The cakes do not lose their shape when leached and they may then be cooked as desired. The product as prepared is an inexpensive, high protein, stable food that does not require refrigeration prior to use.

The pilot plant was set up in Progresso, Yucatan, Mexico, to study the raw materials that could be used including trimming parts and rejects from filleting plants and "trash" fish. The species that were used successfully were identified by the authors as follows: red gurnard (Paranthias furcifer); mojarra (Eucinostomus gula, Diapterus plumieri); grouper (Epinephelus morio); red snapper or chacchic (Aemulum espurus); and sardine (Anchoa mychilli). The cost of a pilot plant

 (over)

7.597 MEASUREMENT OF FORMALDEHYDE IN FISH MUSCLE USING TCA EXTRACTION AND THE NASH REAGENT

Castell, C. H., and Barbara Smith (Fisheries Research Board of Canada, Halifax Laboratory, Halifax, Nova Scotia, Canada)
Journal of the Fisheries Research Board of Canada 30, No. 1, 91-98 (Jan. 1973)

The purpose of this study was to examine the procedure for estimation of formaldehyde in biological materials by means of trichloroacetic acid (TCA) extraction and the Nash test [T. Nash, Biochem. J. 55, 416-421 (1953)]. The Nash test is based on the formation of diacetyldihydrolutidine from acetylacetone and formaldehyde in the presence of excess ammonium salt. The authors attempted to estimate the proportion of the total formaldehyde present in fish muscle that can be recovered by TCA extraction. Measured amounts of formaldehyde were added to the sample of fish muscle, the amount of formaldehyde recovered in the TCA extract was measured, and the percentage of added formaldehyde was then calculated. A reasonably constant "recovery factor" for a given species of fish, makes it possible to convert the results of the Nash test on a TCA extract into values that more closely approximate the total amount of formaldehyde in the tissues. The average recovery from 15 different samples of cod muscle was 51.3% (standard deviation from the mean of 5.6). Inasmuch as the capacity of the muscle to bind formaldehyde is primarily determined by its chemical composition, and as the composition of the muscle varies from one species of fish to another, it seems likely that a different recovery factor may be required for each species.

(over)

6.54 (3.)

would be $11,660 of which $850 would be in raw materials and finished cakes. In this total investment $6,110 would be the cost for machinery and equipment. The design capacity was 250 kg. of dry salted cakes in 8 hr. The price per kg. of protein in fish cake was between $0.56 and $2.24 compared to milk at $5.68 per kg. of protein, cheese at $13.36 per kg., and beef at $9.04 per kg.

The recipe used in the taste trials consisted of frying three cloves of garlic and 50 g. of onion in olive oil, adding 200 g. of tomatoes and one-fourth of a sweet pepper, and frying the mixture for 10 min. A shredded, desalted fish cake was added, followed by 20 g. of "achiote" (a local condiment) suspended in the juice of a sour orange. The mixture was then allowed to simmer for 30 min., and it was served in tacos or in sandwiches. Of the adults tested, 84 to 88% liked the food prepared with fish cakes made from fillets, trimmings of filleting operations, or rejects from filleting. Almost all children tested liked the foods prepared for breakfast and lunch.

The authors believe this method for preserving high-protein, low-cost food is applicable to developing countries for feeding undernourished populations.
[2 figures, 12 tables, 3 references] SW

6.54 PROTEIN-ENRICHED CRACKER FOR COMBAT RATIONS

Audoire, P. J., P. Ramel, M. Th. Lanteaume, A. J. Le Clerc, M. Yver, and F. Duiac
(Serv. Cent. Etud. Realisations, Subsist., Paris, France)
Chemical Abstracts 77, No. 17, 112661n (Oct. 23, 1972)

7.597

Heating of fish muscle increases its ability to bind formaldehyde; therefore, the recovery factors for raw muscle are not applicable to the same muscle that has been cooked. The amount of added formaldehyde that was recovered from the fish muscle varied with variations in the procedures used in preparing the muscle, making the extract, and carrying out the test.
[4 figures, 1 table, 13 references] FTP

7.42 RAPID DETERMINATION OF SELENIUM IN FOODSTUFFS BY NEUTRON ACTIVATION ANALYSIS

Chun, S. Y.
Korean J. Sci. Technol. 4, No. 2, 61-71 (1972) (In English)
Food R.A. Abstracts 26, No. 1, Abstract No. 19, 3 (Jan. 1973)

The method used and the results obtained in determining the amount of selenium in various foodstuffs (including rice, vegetables, fruits, seafoods, dairy products and chicken) are given. Selenium content values for different foodstuffs varied between 0.07 μg/g and 3.36 μg/g. The problems involved in determining trace elements, the effect of a deficiency of selenium, the toxicity of selenium, the geographical differences in selenium content of foods, and the need for further research into the biological effects and the changes in selenium content of foods during processing and cooking are discussed. P.A.Y. Reprinted

---

6.35 (6.31)

Viscosity was higher in carrageenan taken from estuarine plants than carrageenan taken from plants in coastal regions. Carrageenan concentrations, gel strength, and viscosity were greater in late fall-early winter harvests; the lowest values were found in plants harvested during spring-early summer.
[7 figures, 4 tables, 13 references] SW

6.36 INDUSTRIAL UTILIZATION OF ZOSTER

Panasyuk, V. G., V. N. Naumov, and I. M. Mogilevskii (U.S.S.R.)
Chemical Abstracts 77, No. 26, 166435k (Dec. 25, 1972)

7.42 (9.19)

Species of fish	Number of samples	Mercury content (range)	Species of fish	Number of samples	Mercury content (range)
		p.p.m.			p.p.m.
Swordfish	163	0.08-5.2	Dolphin	11	0.034-0.15
Black marlin	1	--	Grey mullet	11	0.01 -0.02
Blue marlin	10	0.56-3.28	Red snapper	12	0.19 -0.46
Sail fish	10	0.03-0.14	Spotted mackerel	11	0.028-0.074
Mako shark	5	1.1 -1.6	Frigate mackerel	7	0.020-0.15
Black finned shark	9	0.45-1.1	White pomfret	1	--
Hammer head	10	0.70-2.2	Milk fish	4	0.012-0.014
Black shark	13	0.22-0.73	Round herring	1	--
White tipped shark	4	0.40-0.58	Slipper lobster	2	0.027-0.031
School shark	21	0.10-0.44	Sand shrimp	6	0.012-0.023
Spanish mackerel	15	0.05-0.20	Blue crab	6	0.010-0.029
Yellowfin tuna	154	0.05-0.62			

[6 tables, 12 references] FTP

7.8 DETERMINATION OF FORCED DRIP FROM THE FISH MEAT TISSUE BY THE CENTRIFUGING METHOD [OZNACZANIE WYCIEKU WYMUSZONEGO W TKANCE MIĘŚNIOWEJ RYB METODĄ WIRÓWKOWĄ]

Podeszewski, Z., and L. Drelichowski
Przemysł Spożywczy., No. 7, 269-271 (1971)
Polish Technical and Economic Abstracts NR2(86), 87 (1972) (Published by Centrum Informacji Naukowej, Technicznej i Ekonomicznej, Warszawa, Al. Niepodległości 186, Poland)

The method for determining forced drip in fish tissue is as follows: Fish tissue samples, 4 mm. thick and 10 mm. in diameter, are brought to a programmed temperature of 18° or 2° C. All subsequent procedures should be carried out under isothermal conditions. The samples must be weighed to an accuracy of 1 mg. The tissue samples are centrifuged at 3,000 r.p.m. (about 820 g) for 15 min.
[1 figure, 3 tables]

FTP

7.85 (7.86) BACTERIOLOGICAL SURVEY OF THE BLUE CRAB INDUSTRY

Phillips, Fred A., and James T. Peeler (Food and Drug Administration, Washington, DC 20204)
Applied Microbiology 24, No. 6, 958-966 (Dec. 1972)

The blue crab industry stretches along the coasts of the United States from Maryland to Galveston, Tex.; the greatest concentration of the industry is in the Chesapeake Bay area. The crabs are brought to the processing plant alive and cooked immediately in boiling water or in a steam retort. Cooking in a steam retort is most common, at about 121° C., for periods ranging from 7 to 23 min. The crabs are cooled at ambient temperatures for 3 to 16 hr. Where processing plants have refrigerators the crabs are stored in them until the meat removing operation begins. Temperatures in these coolers are between 4.4 and 6.7° C. Some of the cooler temperatures were as high as 15.6° C.

During sanitation inspections of 46 crabmeat processing plants on the Atlantic and Gulf coasts, 487 samples of whole crabs after cooking, cooked crabs after cooling, crab bodies, and whole crab claws were collected. Further, 1,506 1-lb. cans of crab were collected, including 518 cans of regular meat, 487 cans of claw meat, and 501 cans of lump meat. These samples were analyzed bacteriologically. Four bacteriological count indices were used: coliforms per gram, Escherichia coli per gram, coagulase positive staphylococci per gram, and aerobic plate counts per gram.

The results indicated that crab meat from plants in Mississippi, Louisiana, and Texas had higher counts for the four indices in 19 out of 24 cases than crab

(over)

8.4 (9.10)(9.11) STRUVITE AND PREBIOTIC PHOSPHORYLATION

Handschuh, G. J., and L. E. Orgel (Salk Institute for Biological Studies, San Diego, CA 92112)
Science 179, No. 4072, 483-484 (Feb. 2, 1973)

The level of dissolved inorganic phosphate in the oceans at present ranges from 10^{-3} to 10^{-6}M. This low level is probably maintained by the insolubility of minerals of the apatite group, particularly hydroxylapatite, $Ca_5(OH)(PO_4)_3$. The compound is relatively inert and cannot readily be used as a source of phosphate for the synthesis of organic phosphates of prebiological interest.

The authors suggest, however, that struvite ($MgNH_4PO_4 \cdot 6H_2O$) rather than apatite or amorphous calcium phosphate is precipitated when phosphate is added to sea water containing more than 0.01M NH_4^+ ions. Thus, the struvite may have precipitated from evaporating sea water on the primitive earth and may have been important for prebiotic phosphorylation.
[1 table, 16 references]

FTP

9.11 ON THE OCEANOGRAPHIC CONDITION FOR ALBACORE IN THE WESTERN SOUTH PACIFIC OCEAN

Ishii, Kiyohiko, and Shoji Saito (Faculty of Fisheries, Hokkaido Univ., Japan)
Bulletin of the Japanese Society of Scientific Fisheries 38, No. 12, 1341-1349 (Dec. 1972) [In Japanese; figures, tables, and abstract in English]

Albacore are abundant in the western sea area of the Fiji Islands. Oceanographic observations were made in this area during November of the years from 1964 to 1968 to determine the reason for this abundance of albacore. The water mass was flowing from west to east. The water had a peak salinity of about 35.7 ‰ at the 200-m. depth level. The maximum hook rate for longline albacore fishing was at 200-260-m. depth level. The authors believe that the observed discontinuity of temperature and salinity of the sea structure in this area is directly related to the formation of the fishing grounds for albacore.
[9 figures, 2 tables, 14 references]

FTP

7.85 (7.86)

meat from plants along the Atlantic coast and the Gulf coast of Florida. In addition, aerobic plate counts of retail crab meat from the previous day's production were higher than the counts made on the day of inspection at the processing plant. Regular crab meat had higher aerobic plate counts than claw or lump meat.

When the crab meat was processed quickly, under good sanitary conditions, the bacteriological indices were better than those from plants operating under substandard sanitary conditions. Crab meat produced under good sanitary conditions had the following bacteriological counts: coliform organisms of less than 20 per gram; no E. coli; coagulase positive staphylococci average of less than 30 per gram in 93% of the plants; and aerobic plate count average of less than 100,000 per gram in 93% of the plants, with the counts from 85% of these plants less than 50,000 per gram.

The results of the survey indicated to the authors that the processors should be able to achieve a product with good microbiological quality by applying simple rules of sanitation.

[9 tables, 10 references]

SW

9.11 STUDIES ON THE OSMOTIC PRESSURE OF ENVIRONMENTAL MEDIA AND BODY FLUID OF MARINE FISH--I. THE OSMOTIC PRESSURE OF THE SEA WATER ON THE MIGRATING ROUTE OF PELAGIC MARINE FISH

Hanaoka, Tasuku, and Ar Jone Chu (Dept. Fisheries, Faculty of Agr., Kyushu Univ., Hakozaki, Fukuoka, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 38, No. 12, 1351-1356 (Dec. 1972)

In an attempt to obtain further understanding of the migratory behavior of pelagic marine fish, the authors determined the osmotic pressure and the temperature of the waters in which the fish were caught. These data were then correlated with the observed behavior of the fishes. The information was collected from fisheries survey vessels operating in the fishing ground areas. The authors concluded that the osmotic pressure of the sea water is closely related to the life behavior of pelagic marine fish. The fish seem to migrate in water having certain levels of osmotic pressure peculiar to each fish; the relationship may vary, also, with the maturity of the fish.

[2 figures, 11 references]

FTP

7.8 PSYCHOPHYSICAL MEASURES OF TEXTURE

Moskowitz, H. R., B. Drake, and C. Akesson
J. Texture Stud. (JTXS-B) 3, No. 2, 135-145 (1972)
Food R.A. Abstracts 26, No. 1, Abstract No. 97, 17 (Jan. 1973)

Psychophysics is the correlation of sensory evaluation with physical measurements. In this review the sequence of operations required to construct meaningful scales for dimensions of perceived texture is described. (26 references) J.A.D.

Reprinted

8.8 CONSUMER AWARENESS OF AND ATTITUDES TO FOOD TEXTURE. II. CHILDREN AND TEENAGERS

Szczesniak, A. S.
J. Texture Stud. 3, No. 2, 206-217 (1972)
Food R.A. Abstracts 26, No. 1, Abstract No. 77, 13 (Jan. 1973)

A discussion of teenagers' and childrens' attitudes to food texture is presented based on information obtained from original consumer interviews and published data relative to growth and development. Teenagers appear to have a better understanding of the concept of texture, suggesting that the texture of food may assume a greater importance with the oncoming generation of adult consumers. J.A.D.

Reprinted

7.81 (0.32) GAS-CHROMATOGRAPHIC DETERMINATION OF VOLATILE AMINES

Gasco, L., F. Valverde, and R. Barrera (Dr. Quim. Isot., Junta Energ. Nucl., Spain)
Chemical Abstracts 77, No. 3, 16168m (July 17, 1972)

8.8 (3.11) LABORATORY QUALITY CONTROL OF THE SMOKING LIQUID IN THE SMOKED FISH INDUSTRY

Lapshin, I. I., T. G. Rodina, and L. P. Yakushova (Mosk. Inst. Nar. Khoz. im. Plekhanova, Moscow, U.S.S.R.)
Chemical Abstracts 77, No. 17, 112618d (Oct. 23, 1972)

9.11 (9.19) ZINC-65 IN BENTHIC INVERTEBRATES OFF THE OREGON COAST

Carey, Andrew G., Jr. (Dep. Oceanography, Oregon State Univ., Corvallis, Oreg.)
Chemical Abstracts 77, No. 15, 98367n (Oct. 9, 1972)

9.11 COOPERATIVE GULF OF MEXICO ESTUARINE INVENTORY AND STUDY, FLORIDA: PHASE 1, AREA DESCRIPTION

McNulty, J. Kneeland, William N. Lindall, Jr. (National Marine Fisheries Service, NOAA, Gulf Coastal Fisheries Center, Biological Laboratory, St. Petersburg Beach, FL 33706), and James E. Sykes (National Marine Fisheries Service, NOAA, Atlantic Estuarine Fisheries Center, Beaufort, NC 28516)
NOAA Technical Report NMFS CIRC-368, U.S. Dept. of Commerce, NOAA, National Marine Fisheries Service, Seattle, Wash. (Nov. 1972), 126 pp. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. Price $1.25.

Newly-developed tables and maps depict the dimensions, submerged vegetation, tidal marshes, mangrove swamps, commercial oysters beds, leased oyster-rearing areas, sources of pollution, drained tidal marshes, and filled areas of Florida's west coast estuaries. Published and unpublished information on temperature, salinity, geology, artificial fishing reefs, stream discharge, human population, commercial fishing, and economic development is presented in new form.

If the total area of estuaries (3,003,312 acres = 1,215,440 ha) is considered to be the area of open water (2,081,525 acres = 842,393 ha) plus the area of mangrove swamps (393,160 acres = 159,112 ha) and tidal marshes (528,528 acres = 213,895 ha), then roughly one-half of the total area of estuaries is unvegetated; the remaining half is about equally divided among mangroves, tidal marshes, and submerged vegetation.

 (over)

9.12 (1.34)(1.35) FOOD OF JUVENILE PINK AND CHUM SALMON IN PUGET SOUND, WASHINGTON

Gerke, Robert J. (Washington Dept. of Fisheries, Olympia, Wash.), and Victor W. Kaczynski (Dept. of Oceanography, University of Washington, Seattle, Wash.)
Technical Report No. 10, Washington Dept. of Fisheries, Olympia, Wash. (1972), 27 pp.

Pink and chum fry, after emerging from the spawning gravel, migrate immediately to salt water. These small fish (about 30 mm. in fork length) enter the estuaries in April and May. In Puget Sound the young fish can be found along shoreline areas in waters of 1 m. or less. Studies were performed to determine the kinds of organisms the young fish prey upon.

Pink and chum salmon fry were collected from three sites which were major salmon management areas and harbored good concentrations of fry. The three areas were: Anderson Island, Southern Puget Sound; Port Susan, Central Puget Sound; and Toandos Peninsula, Hood Canal. Each of the areas was sampled at 10-day intervals during April and May 1970. The stomach contents of the fry were analyzed with the aid of a microscope, and all food organisms found were placed in either of four categories: pelagic, epibenthic, benthic, and terrestrial. Epibenthic was defined as that area on or near the bottom and benthic referred to organisms living within the bottom substrate.

The stomach contents of the salmon fry varied depending on the area sampled. Fish from Anderson Island fed on harpacticoid copepods (minute crustaceans) which made up 95% of the diet. The diet of the fish from Port Susan was more varied; barnacle nauplii and mysis (shrimplike crustacean) larvae predominated in the

 (over)

9.14 NUTRITIONAL REQUIREMENTS OF THE GILTHEAD BREAM CHRYSOPHRYS AURATA. QUANTITATIVE PROTEIN REQUIREMENTS

Sabaut, J. J., and P. Luquet (Station de Recherches de Nutrition, Centre National de Recherches Zootechniques, I.N.R.A., Jouy-en-Josas, France)
Marine Biology 18, No. 1, 50-54 (Jan. 1973)

Successful aquaculture production of marine fish depends upon adding the correct quantity of protein (the most expensive item in feed) to the diet. Earlier work indicated that the gilthead bream (a candidate species for aquaculture production) required a large amount of protein in its feed. No precise data had been included in the report.

To determine the protein requirements of the gilthead bream, a series of experiments were performed with diets containing various amounts of protein. Young bream, less than 1 year old, were caught and divided into six groups and fed six semisynthetic diets for 4 months. The diets contained 11.5, 20.25, 28.06, 38.4, 53.1, and 60.8% protein, respectively, in proportion to dry feed. The diets had a casein and cornstarch base.

The intake of the fish varied with the protein content in the diet; that is, the less protein in the feed, the higher the intake. Growth increase corresponded to protein content in the diet up to 40%; weight gain of fish on diets containing 53.1 and 60.8% protein could not be differentiated from weight gain on the 40% protein diet. However, the protein efficiency ratio (the ratio of weight gain to protein intake) was higher for diets containing less protein. In addition, the protein utilization coefficient (the amount of protein retained) showed a better yield for fish receiving less protein.

 (over)

9.15 STUDIES ON THE OCCURRENCE AND BIOCHEMICAL PROPERTIES OF VIRULENT AND AVIRULENT STRAINS OF FRESHWATER FISH PATHOGEN, AEROMONAS LIQUEFACIENS

Kow, Guang-Hsiung (Dept. of Zoology, College of Science, National Taiwan University)
Journal of the Fisheries Society of Taiwan 1, No. 2, 8-13 (Sept. 1972) [In Chinese; abstract and tables in English]

Three hundred and thirty-nine strains of A. liquefaciens were isolated from eel, carp, goldfish, ayu, and fishpond water in various locations in Japan during February 1966 to July 1970. The strains were divided into three categories relative to their pathogenicity: virulent, attenuated virulent, and avirulent. One hundred and two of the 107 virulent strains were VP [Voges-Proskauer test] positive and produced gas; 3 of the 23 VP negative strains were virulent; and 1 of the 16 nongas producing strains was virulent.
[4 tables, 19 references]

FTP

9.12 (1.34)(1.35)

diet in April. Gammarids, barnacle nauplii (larvae), invertebrate eggs, and harpacticoid copepods comprised most of the prey in May. The prey of young salmon from Toandos Peninsula included harpacticoid copepods, barnacle nauplii, and invertebrate eggs in April, and gammarids (tiny shrimplike bottom dwellers), euphausids (tiny crustacean), harpacticoid copepods, copepodites, and a variety of other organisms comprised the diet in May.

These results indicate that epibenthic organisms are the most important food types. These small organisms consist of crustaceans which inhibit a layer of water near the bottom in the littoral to sublittoral zone. They are shrimplike in appearance, and they move by crawling or hopping on the bottom and swimming for short distances.

The ecological zone that these organisms inhabit (shorelines and beaches) is vulnerable to alterations by land developments such as piers, jetties, land fills, marinas, bulkheads, and other shore facilities. These salt-water installations destroy habitat that supports food organisms that comprise young salmon prey.
[4 figures, 15 tables, 6 references] SW

9.16 (5.5) ESSENTIALITY OF VITAMIN C IN FEEDS FOR INTENSIVELY FED CAGED CHANNEL CATFISH

Lovell, Richard T. (Dept. of Fisheries and Allied Aquaculture, Auburn University, Auburn, AL 36830)
Journal of Nutrition 103, No. 1, 134-138 (Jan. 1973)

Sixteen hundred channel catfish fingerlings were stocked in 1-m^3 floating cages, 400 per cage, and fed production-type diets intensively for 180 days. Half of the fish were fed a diet that was nutritionally sufficient except for being low in vitamin C and the remaining fish were fed the same formulation with supplemental vitamin C. At the end of the feeding period each fish was examined for gross signs of vitamin C deficiency and fish were sampled for examination for internal symptoms by X-ray, tissue analysis, and histological techniques. Weight gains (g), feed conversions (g gain/g feed), survival (%) and incidence of physical deformation (%) for fish fed diets with and without supplemental ascorbic acid, respectively, were 531 vs. 331; 1.29 vs. 1.88; 98.0 vs. 77.8; and 3.9 vs. 45.0. Deformities were primarily scoliosis and lordosis with depigmented areas on backs. Vitamin C deficiency resulted in higher mortality from pathogenic bacteria infestation. Differences in response to the two diets did not become apparent until after the fish had grown satisfactorily for at least 12 weeks or weighed 100 to 180 g. Dietary supplementation of vitamin C was reflected in blood, liver and anterior kidney contents of ascorbic acid but not in condition of gill filaments or opercula.
[2 figures, 3 tables, 15 references] Author's abstract

9.11

Human population in coastal counties increased from 614,616 persons in 1930 to 3,320,226 persons in 1970, resulting in adverse effects from pollution to 43 percent of estuarine areas, filling of 23,521 acres (9,519 ha) mainly for residential and industrial development, and draining of 26,676 acres (10,796 ha) of tidal marshes for mosquito control. Increasing population correlates directly with the number of sources of pollution, filled area, and the area closed to shellfishing by public health authorities; thus, failure to control the adverse effects of population growth will clearly result in continued rapid degradation of estuarine habitat on Florida's west coast.
[46 figures, 11 tables, 168 references] Authors' abstract

9.14

The authors concluded that 40% protein in the diet may be considered the minimum for optimum growth of gilthead bream. This percentage is similar to the requirements of chinook salmon, rainbow trout, sockeye salmon, catfish, and carp reported in other work.
[1 figure, 4 tables, 23 references] SW

9.14 AMINO ACIDS ESSENTIAL FOR THE GROWTH OF EELS, ANGUILLA ANGUILLA AND ANGUILLA JAPONICA

Arai, Shigeru, Takeshi Nose, and Yoshiro Hashimoto (Freshwater Fish. Res. Lab., Hino, Japan)
Chemical Abstracts 77, No. 17, 112804m (Oct. 23, 1972)

9.11 (9.19) SEASONAL AND AREAL DISTRIBUTION OF RADIONUCLIDES IN THE BIOTA OF THE COLUMBIA RIVER ESTUARY

Renfro, William C., William O. Forster, and Charles Osterberg (Dep. Oceanography, Oregon State University, Corvallis, Oreg.)
Chemical Abstracts 77, No. 15, 98393t (Oct. 9, 1972)

9.16 (1.9) AN EVALUATION OF STRIPED BASS FINGERLING CULTURE

Humphries, Earl T., and Kenneth B. Cumming (Bureau of Sport Fisheries and Wildlife, Virginia Cooperative Fishery Unit, Virginia Polytechnic Institute, Blacksburg, VA 24061)
Transactions of the American Fisheries Society 102, No. 1, 13-20 (Jan. 1973)

The establishment of a self-propagating population of striped bass in landlocked water has not succeeded. The techniques for propagating and transporting fry have been developed, but stocking fry has not succeeded because of high mortality. The stocking of adults in spawning condition to establish the fish in inland waters also failed.

The requirement of striped bass reproduction is that the eggs remain suspended in a current until hatched; otherwise, the eggs settle to the bottom and suffocate. Most reservoirs where populations of striped bass are established do not provide the required condition for hatching of the eggs. Hatcheries were established to provide fish for stocking the reservoirs. In observations made on female adults, those with immature eggs could be induced to ovulate with hormones, but the eggs would not hatch. In addition, for eggs to produce viable fry, the eggs had to be taken within an hour of ovulation. In 1964, fry were stocked in an earthen pond, which was fertilized to produce a heavy zooplankton bloom, to determine if fry could be reared to fingerlings in this manner. About
(over)

9.17 (2.1126) VARIATIONS IN CATCHABILITY OF FISHES WITH COLOR OF GILLNETS

Jester, Douglas B. (Dept. of Animal, Range and Wildlife Sciences, New Mexico State University, Las Cruces, NM 88003)
Transactions of the American Fisheries Society 102, No. 1, 109-115 (Jan. 1973)

An inherent objective in the activities of fishery research fish population control, and commercial fishing, is to catch more fish per unit effort and to catch species or sizes more selectively. Colored gill nets were tested in a large reservoir on the Rio Grande River in southwestern New Mexico, to determine if they could increase efficiency and selectivity of catch rates in comparison to white nets.

The results indicate that the colored nets caused positive or negative selectivity for various species. Most important differences consisted of reduced catches in colored nets. The use of colors allowed selection of species with fewer unwanted fish. Compared to white nets, more catostomids (suckers and buffalo fish) and carp and fewer game fish were caught in brown nets. Six species of sunfishes were caught at higher rates in orange nets than in any other color, and largemouth bass were taken selectively in yellow nets. Brown nets offered advantages for commercial fishing and fish control efforts.
[5 tables, 10 references] SW

9.16 WATER LEVELS, FLUCTUATION, AND MINIMUM POOLS IN RESERVOIRS FOR FISH AND OTHER AQUATIC RESOURCES - AN ANNOTATED BIBLIOGRAPHY

Fraser, J. C. (Environment Protection Authority, Victoria, Australia)
FAO Fisheries Technical Paper No. 113, Food and Agricultural Organization of the United Nations, Rome, Italy (Nov. 1972), 42 pp. (Distribution restricted)

This bibliography is for engineers and fishery biologists who are engaged in the planning and operation of reservoirs on inland waters of the world; it provides them with a list of readily available literature dealing with the effects of fluctuating levels and of pool levels on fish and other aquatic resources. This collection of references, abstracts, and notes was accumulated over a short period of time and is not a complete survey of all the available literature.

Demands for water have led to increased storage or retardation of runoff through impoundment--either in natural lakes where the level has been raised by dams or by the construction of reservoirs, or manmade lakes. In such impoundments the water levels must of necessity rise and fall. In some natural lakes that have been impounded the original natural water level may have been raised, but in others the water level may also be lowered well below its natural level. In manmade lakes, there may be severe seasonal fluctuations of water levels, or even complete drainage in years of low runoff and heavy downstream demands for water.

Harmful effects on fish and other aquatic resources may result from the rise and fall of water levels in reservoirs. The food components may be altered in volume, availability, and composition. Spawning of the fish may be disturbed or
(over)

9.16 (1.81) STUDIES ON SUSPENDED CULTURE OF OYSTER CRASSOSTREA GIGAS IN THE KOREAN COASTAL WATERS. (1) ON THE GROWTH RATE OF OYSTER IN GROWING AREA

Bae, Gyung Man, and Pyung Arm Bae
Bulletin of the Fisheries Research & Development Agency No. 9, 71-84 (July 1972) (Pusan, Korea) [In Korean; abstract, figures, and tables in English]

The growth of oysters was examined during their culture in the Bay of Yun-Goo-Ree, Ko-Je Island, off southern Korea from January to December 1970. The raft hanging method of culture was used. The oysters grew faster near the surface of the water than at the middepth, or near the bottom. The oysters grew faster at the higher water temperatures, during June and July when the water temperature ranged from 18.0° to 26.6° C.
[9 figures, 5 tables, 6 references] FTP

9.16

prevented, and fish eggs and fry may be killed. Permanent growth of useful aquatic vegetation may be inhibited. Fish may die from lack of space, increased turbidity, or change in chemical conditions.

However, benefits may accrue through fluctuations in water levels. A reduction of water levels immediately following deposition of eggs may permit the control of predators or competing species of fish. Flooding of lake margins during the spawning seasons may aid the reproduction of other wanted species or increase the water's productivity. Complete drainage of a reservoir and then refilling and restocking may increase fish production.

Each reservoir is an entity in itself, and it is not possible to generalize on the effects caused by water level fluctuations. The bibliography, then, should be helpful to those seeking useful information on the subject.

[Abstract of the Foreword prepared by William A. Dill] FTP

9.16 SHELL STRINGER APPARATUS

Austin, George E.; assignor to Richard F. Rawlings, 226 SW 131st St., Seattle, WA 98146 (pat.)
U.S. Patent Reissued 27,577 (Feb. 6, 1973)

This patent is for a shell stringing device which punches a hole in each oyster shell and strings the shells onto a wire. FTP

9.16 (1.9)

30,000 fingerlings were reared, and the results were considered a breakthrough. Newly hatched fry are especially vulnerable to predation. The practice of holding them in troughs until they are swimming strongly and actively feeding reduces their vulnerability to predation after they are transferred to ponds. Sensitivity to handling, or abrupt contact with light or loud noises, may induce shock in the larvae which usually causes death. The following table is a summary of the best conditions for rearing striped bass larvae. Further research in nutrition of fry is required before large-scale rearing to fingerling size can be undertaken.

Factor	Range	
	Lower	Upper
Temperature (°C.)	16.0	19.0
Dissolved oxygen (p.p.m.)	5.0	--
pH	7.5	7.9
Sulfates (p.p.m.)	--	200.0
Chlorides (p.p.m.)	--	950.0
Dissolved solids (p.p.m.)	100.0	900.0

[1 figure, 1 table, 29 references] SW

9.16 (1.81) STUDY ON SPAT COLLECTION OF OYSTER (CRASSOSTREA GIGAS THUNBERG)

Bae, Gyung Man, and Pyung Arm Bae
Bulletin of Fisheries Research & Development Agency No. 9, 47-54 (July 1972) (Pusan, Korea) [In Korean; abstract, figures, and table in English]

This work concerned the collection of seed oysters and involved an attempt to determine the spat fall and spawning season in the Bay of Chinhae and Bay of Haechang, southern Korean coast. The work was carried out from June 20 to Oct. 30, 1970.

The development period for oyster larvae is about 16 days when falled as spat sets in the Bay of Chinhae (water temperature of 28° C. and specific gravity 1.016); it was about 18 days in the Bay of Haechang (water temperature of 25.1° C. and specific gravity of 1.022). The best period for spat fall was the end of September in the Bay of Chinhae and the beginning of August in the Bay of Haechang. Spawning of the oysters was induced by a sudden change in water temperature and specific gravity. The average temperatures of the water during the spawning seasons were 24.1° and 22.1° C. in the Bay of Chinhae, and 23.2° and 25.2° C. in the Bay of Haechang.

[6 figures, 1 table, 12 references] FTP

9.17 APPLICATION OF THEORY AND RESEARCH TO FRESHWATER AND MARINE FISHERIES MANAGEMENT

Coble, Daniel W. (editor) (Wisconsin Cooperative Fishery Unit, University of Wisconsin, Stevens Point, WI 54481)
Transactions of the American Fisheries Society 102, No. 1, 155 (Jan. 1973)

The following articles were presented at the 101st Annual Meeting of the American Fisheries Society held in Salt Lake City, Utah, September 15-18, 1971. Because they were so well received at the meeting, the papers were published in this journal for the benefit of the wider audience that did not attend the meeting.

"Application of Theory and Research in Fishery Management of the Laurentian Great Lakes," by Stanford H. Smith, pp. 156-163. [1 table, 1 figure, 22 references]

"Application of Theory and Research to Management of Warmwater Fish Populations," by Robert O. Anderson, pp. 164-171. [5 figures, 2 tables, 22 references]

"Application of Research to the Management of British Columbia Sockeye Salmon," by K. Radway Allen, pp. 172-177. [19 references]

"The California Sardine--Anchovy Fisheries," by G. B. Talbot, pp. 178-187. [2 figures, 1 table, 31 references]

"Application of Theory and Research in Freshwater and Marine Fisheries Management Programs--A Discussion of the Papers Given by S. H. Smith, R. O. Anderson, K. R. Allen, and G. B. Talbot," by Richard H. Stroud, pp. 188-193. [2 references]

"Application of Theory and Research in Freshwater and Marine Fisheries Management Programs--A Discussion of the Papers Given by S. H. Smith, R. O. Anderson, K. R. Allen, and G. B. Talbot," by John J. Magnuson, pp. 194-195.

SW

9.17 EXOTIC AQUATIC ORGANISMS IN FLORIDA WITH EMPHASIS ON FISHES: A REVIEW AND RECOMMENDATIONS

Courtenay, Walter R., Jr. (Dept. of Biological Sciences, Florida Atlantic University, Boca Raton, FL 33432), and C. Richard Robins
Transactions of the American Fisheries Society 102, No. 1, 1-12 (Jan. 1973)

Tropical aquarium fish importers and amateur aquarists have been found to be responsible for the introduction of some of the fishes and plants not native to Florida and the United States. There have also been purposeful introductions of fish for sport, food, aquarium resources, or for biological control of pests. These introductions are often made without adequate information on the possible consequences. Biological control of aquatic weeds--some of which were introduced with a aquarium fish importation--led to the introduction of the blue tilapia by the Florida Game and Fresh Water Fish Commission in 1961. This fish now is established in 10 counties of the state; and the streams where it is abundant are devoid of most vegetation and nearly all native fishes. Other incidents with similar ecological damage have occurred in the state.

A potential hazard to public health is the water that accompanies imported fishes. There is the possibility that infected snails which are the intermediate host for the disease caused by Bilharzia could be released to Florida waters from the transport water of fish imported from Africa; the disease is endemic to large parts of Africa.

The following steps should be taken as a minimum precaution to prevent imports hazardous to the ecology: (1) reasons for proposing the introduction of a

(over)

9.19 MARINE POLLUTION AND SEA LIFE

Ruivo, Mario (General editor)
Fishing News (Books) Ltd., 23 Rosemount Ave., West Byfleet, Surrey, England (1972), 624 pp. Price £17.75, postage 30p. [Articles are in English, French, or Spanish; abstracts are in the two languages different from the article.]

For those who are interested in or working on the problems of pollution, this book can be a source and guide. Two hundred and eight authors have contributed 231 articles with a bibliography for each. The contributions were originally given at the FAO Technical Conference on, "Marine Pollution and Its Effects on Living Resources and Fishing," held in Rome, Italy, December 9-18, 1970. The articles have been gathered into seven major sections.

In the first section, "Marine Pollution in the World Today," the condition of coastal European and North American waters is described extensively. There are also reports on conditions off Japan, the Philippines, Hong Kong and Singapore, Australia, and Peru.

In the second section, "Behaviour and Fate of Pollutants in the Marine Environment," the articles deal with the physical, chemical, and biological processes naturally available to influence various pollutants. The capability of these processes to inactivate pollutants is not completely known. Simulation and hydrodynamical numerical models could be helpful in predicting such capability.

The third section, "Effects of Pollutants on the Biology and Life Cycle of Marine Organisms," comprises reports on experiments that show the necessity of establishing standard methodology for determining the long-term effects of pollutants.

(over)

9.19 BIOLOGICAL ASPECTS OF THEMAL [sic] POLLUTION. II. SCIENTIFIC BASIS FOR WATER TEMPERATURE STANDARDS AT POWER PLANTS

Coutant, C. C. (Environmental Sciences Div., Oak Ridge National Laboratory, Oak Ridge, Tenn.)
Critical Reviews in Environmental Control 3, No. 1, 1-24 (Aug. 1972)

In a previous report the author reviewed the questions regarding thermal discharges from electricity-generating plants. In this second report the author reviewed the subject relative to the sources of potential ecological damage. In defining thermal requirements of aquatic species a set of criteria must be developed. These criteria are related to the water temperature that a species will tolerate in each of its life stages (egg, larva, adult). Complex diagrams are presented which combine time with temperatures tolerated, acclimation temperatures, temperature ranges for spawning, growth, and mortality. By means of these diagrams, the effects of the high and low temperatures of the plant's effluents can be predicted for a species. A list of species with bibliographical references to upper and lower temperature extremes that can be resisted is presented.

The makeup of aquatic communities may be altered as a result of temperature changes, and the change may be in the form of increased nuisance organisms such as clumping algae. The planning of the cooling system effluent should be to prevent buildup of nuisance organisms and maintain the population level of a desirable ecological community.

(over)

9.19 (1.81) EFFECTS OF THE POLYCHLORINATED BIPHENYL AROCLOR 1254 ON THE AMERICAN OYSTER CRASSOSTREA VIRGINICA

Lowe, J. I., P. R. Parrish, J. M. Patrick, Jr., and J. Foster (Environmental Protection Agency, Sabine Island, Gulf Breeze, FL 32561)
Marine Biology 17, No. 3, 209-214 (Dec. 1972)

The presence of polychlorinated biphenyls (PCBs) in the marine environment has been widely reported. One PCB, Aroclor 1254, was found in oysters in a local estuary of Escambia Bay, Fla. The presence of the PCB was also found to be widespread in the waters, sediment, and fauna of the bay. Oysters exposed for 96 hr. to concentrations of 10 p.p.b. or more of this PCB were found to have decreased shell growth.

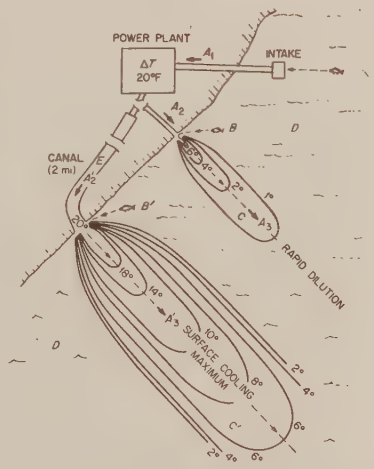
Experiments to determine effects of long-term exposure to Aroclor 1254 were performed. Oysters were grown from spat to adults in flowing sea water containing either 5 p.p.b. of the PCB (for 24 weeks) or 1 p.p.b. (for 30 weeks). The oysters were cleaned, weighed, and measured at 2-week intervals. The growth rate (size and weight) of the oysters exposed to 5 p.p.b. of Aroclor 1254 was reduced in comparison to the growth rate of control oysters grown in the absence of PCB. Growth rate of oysters grown in water containing 1 p.p.b. Aroclor 1254 was unaffected. The residue retained in the oysters grown in 5 p.p.b. of Aroclor 1254 amounted to 425 p.p.m. of the blended oyster tissue. This concentration was 85,000 times that of the PCB in the water; after 28 weeks depuration in PCB-free water these oysters retained less than 0.3 p.p.m. of PCB. Oysters exposed to 1 p.p.b. of Aroclor 1254 showed 101 p.p.m. of PCB in the blended tissue; a concentration 101,000 times more than the PCB in the water. Less than 0.2 p.p.m.

(over)

9.19

An example of an electric power station using lake water for cooling is shown in the figure. There are alternative discharges shown. Warm condenser water can be discharged into the lake at high-flow velocity or through a canal channeling a slow flow.

An analysis of the potential damage to organisms in the important thermal areas is presented.
[6 figures, 2 tables, 104 references]



SW

9.19 (1.81)

of PCB was retained in the tissue after 12 weeks' depuration. Examination for histopathology in oysters exposed to 5 p.p.b. PCB showed, at the end of the exposure period, atrophy of digestive diverticular epithelium and degeneration of vesicular connective tissues with leukocyte infiltration. These tissues did not appear to be pathological in oysters examined after 12 weeks of depuration. This observation indicated that the tissue recovered after depuration.

Oysters are not susceptible to PCB poisoning as are marine crustaceans and fish. The high concentration of PCB in tissue could prevent oysters from being marketed in the event of accidental exposure to PCB.
[4 figures, 1 table, 10 references]

SW

Foulds, Jon Marquis (Buck Seifert and Jost, Morrisville, Pa.)
Chemical Abstracts 77, No. 24, 156066 (Dec. 11, 1972)

9.19 WHAT'S IT ALL ABOUT?
(6.3)

9.17

fish should be given and demonstrated, (2) a search for optional species should be made, (3) a preliminary assessment of impact should be made, (4) the subject should be made public for review, (5) research and experiments should be performed to test the impact of the proposed addition on the environment, and (7) with favorable information the imported organism should be released to the environment. [1 table, 22 references]

SW

Totterman, Harald (Dep. Water Air Improv., Finn. Pulp Pap. Res. Inst., Helsinki, Finland)
Chemical Abstracts 78, No. 6, 33560w (Feb. 12, 1973)

9.19 OXYGEN-CONSUMING ORGANIC MATTER (BOD) IN EFFLUENTS ORIGINATING IN DIFFERENT PULPING PROCESSES OF THE WOODWORKING INDUSTRY. REVIEW OF LITERATURE DURING THE YEARS 1960-1970

9.19

In section 4, "Ecosystem Modifications and Effects on Marine Communities," the articles contain descriptions of the effects of pollutants on communities such as coral reefs, plankton, littoral colonies, and the ecology found adjacent to urban settings.

The fifth section, "Technical Aspects of Minimising Pollution and Countering Its Effects," contains articles on pollution abatement, monitoring pollution, treatment of pollution, and constructive use of pollution.

Section 6, "Effects of Pollutants on Quality of Marine Products and Effects on Fishing," deals with detrimental action of bacterial, taste, odor, and toxigenic pollutants on marine sources of food and food products.

Articles in section 7, "Scientific Basis for International Legislative Control of Marine Pollution in the Interests of Marine Resources and Fisheries," describe the need for advice from the community of scientists in the establishment of international regulations for conservation of marine resources and control of pollution.

SW

Rasmussen, Reinhold A. (Washington State Univ., Pullman, Wash.)
Chemical Abstracts 77, No. 18, 117751b (Oct. 30, 1972)

9.19 WHAT DO THE HYDROCARBONS FROM TREES CONTRIBUTE TO AIR POLLUTION?

9.19 (1.92) THE UPTAKE AND PERSISTENCE OF CARBARYL IN CHANNEL CATFISH

Korn, Sidney (U.S. Bureau of Sport Fisheries and Wildlife, Fish-Pesticide Research Laboratory, Columbia, MO 65201)
Transactions of the American Fisheries Society 102, No. 1, 137-139 (Jan. 1973)

[The persistent organochlorine insecticides such as DDT are being replaced with equally active but less persistent insecticides which are classed with a group of chemicals called carbamates. Carbaryl, known also as Arylam and Sevin, is one of these insecticides. Abstractor's note]

The formula of carbaryl is 1-naphthyl-N-methyl carbamate. Because insecticides applied to crops appear in aquatic environments through drainage of surface runoff or are carried directly to streams by air currents, experiments were performed to determine uptake, storage, and rates of excretion of carbaryl in fish.

Channel catfish were exposed to radioisotopic carbaryl ^{14}C and nonlabeled carbaryl in environmental water or mixed in the diet for 56 days: 0.05 mg. per liter (low) or 0.25 mg. per liter (high) in the water and 0.28 mg. per kilogram (low or 2.8 mg. per kilogram (high) per week mixed in pelleted feed.

No fish mortalities occurred. The mean total residues of labeled carbaryl and its metabolites accumulated by the fish on the high diet was 9 ng. per gram. Residue accumulated after exposure to the high concentration in water was 11 ng. per gram. The residues in low-treatment groups in diet and water were 1 and 2 ng. per gram, respectively. Fish exposed to the high diet eliminated residues rapidly after feeding on the carbaryl free diet for 28 days; they retained

(over)

9.19 (7.9) ANALYSIS OF POLYCHLORINATED BIPHENYLS BY GAS CHROMATOGRAPHY AND ULTRAVIOLET IRRADIATION

Hannan, Ellen J., Donald D. Bills, and Jeffry L. Herring (Dept. of Food Science and Technology, Oregon State University, Corvallis, OR 97331)
Journal of Agricultural and Food Chemistry 21, No. 1, 87-90 (Jan.-Feb. 1973)

Due to the similarity of the polychlorinated biphenyls (PCBs) to DDT, they are carried through the analytical cleanup methods normally used for chlorinated insecticides and give similar response using gas chromatography-electron capture analysis. As a result, the PCBs have often been mistaken for the chlorinated insecticides, especially DDT and DDE. In this study, an ultraviolet method for the identification of certain chlorinated insecticides [W. M. Kaufman, D. D. Bills, and E. J. Hannan, J. Agr. Food Chem. 20, No. 3, 628 (1972)] was used to identify the PCBs alone and in the presence of chlorinated insecticides. By this method, the component was trapped as it eluted from the gas chromatograph, exposing it to laboratory ultraviolet light, and then rechromatographing the resulting products. The degradation pattern of the PCB peak usually differed from the degradation pattern of the chlorinated insecticide having the same retention time. To note any interferences or changes that might occur when chlorinated insecticides and PCBs are present together, a mixture of the chemicals was trapped, irradiated, and rechromatographed. The method was used to analyze samples of herring and salmon oils.

[5 figures, 3 tables, 13 references] FTP

9.19 ENDRIN TOXICOSIS IN RAINBOW TROUT (SALMO GAIRDNERI)

Grant, Blake F., and Paul M. Mehrle (Fish-Pesticide Research Laboratory, Bureau of Sport Fisheries and Wildlife, U.S. Dept. of the Interior, Columbia, MO 65201)
Journal of the Fisheries Research Board of Canada 30, No. 1, 31-40 (Jan. 1973)

The purpose of this study was to determine dietary intakes of endrin resulting in disturbances in growth rate, osmoregulation, and intermediary metabolism. To detect disturbances more readily, the ability of endrin-exposed fish to adjust to moderate physiologic demands of a "loading" stress as may occur in nature was evaluated. The test fish were exposed to forced swimming. The fish were fed dietary levels of 0.215, 0.725, 2.15, and 7.25 p.p.m. (4.3, 14.5, 43, and 145 µg. of endrin per kilogram of body weight per day) for 163 days, and then they were forced to swim for 1 hr. Feeding the endrin to trout affected their serum electrolytes, osmolality, total protein, cholesterol, cortisol, lactate, glucose, liver glycogen, and growth. Forced swimming, alone, affected 9 of the 16 serum parameters tested. Increases in serum Na and Cl and significant increases in osmolality and liver glycogen were directly related to the dosage of endrin. Phosphate, total protein, and cholesterol showed biphasic distribution with dosage. Serum glucose increased by about 50% as a result of the diet providing 145 µg. of endrin per kilogram of body weight per day. The glucose level was not affected by lower dosages of the insecticide. Low doses of endrin inhibited mobilization of liver glycogen; high doses blocked it almost totally. Trout receiving 14.5 µg./kg. or more of endrin had lowered serum cortisol levels; however, the lowest dose elevated the cortisol level. Growth of the trout was inhibited by doses of

(over)

9.19 DDT SUBSTITUTES

Metcalf, Robert L. (Dept. of Zoology, University of Illinois, Urbana, Ill.)
Critical Reviews in Environmental Control 3, No. 1, 25-59 (Aug. 1972)

DDT, [2,2-bis(p-chlorophenyl)1,1,1-trichloroethane] through its widespread use during and after World War II in the control of insect vectors of malaria, typhus, plague, and other diseases, has saved an estimated 50 million lives and prevented 1 billion illnesses. The use of this insecticide may be the most important single factor in promoting the world population explosion. In India, DDT spraying decreased the cases of malaria from 100 million annually in 1933 to 150,000 by 1966, and decreased the mortality from 750,000 annually to 1,500. In the war on insects, the discovery of DDT resistance in the housefly in Sweden, in 1946, was shocking. Since then DDT resistance has appeared in mosquito, body louse, rat flea, bedbug, cockroach, and 22 species of plant pests. As an environmental pollutant, DDT is found everywhere in water, animals, and people, and it threatens the existence of several animals.

DDT has the following characteristics that make an insecticide useful: a melting point of 108° to 109° C., a vapor pressure of 1.5×10^{-7} mm., almost insoluble in water, nearly odorless, extremely durable and persistent, low hazard to man and higher animals, and low cost. The resistance of insects to DDT has made it ineffective in many applications, and its persistence makes it environmentally unacceptable. Substitute insecticides were investigated among the analogues of DDT, but insect resistance continued to appear. Lindane was successful as a replacement for DDT until insect resistance reduced its usefulness. Polchlorinated compounds called cyclodienes; for example, chlordane, were extensively used until

(over)

9.19

insect resistance appeared. The related compounds, aldrin, dieldrin, and endrin were used successfully until insect resistance affected their usefulness. The next series tried were the organophosphates, malathion, parathion, and diazinon. Malathion was found to be more toxic to insects than to higher animals, and it was used extensively and safely. Other organophosphorus compounds are as toxic to higher animals as to insects. Another group of insecticides used was the carbamates. Carbaryl is an insecticide of this group used successfully against lepidoptera, and it has a relatively low toxicity for mammals. The carbamates are easily biodegradable and are vulnerable to hydrolysis.

The search for the perfect insecticide over 30 years has been concentrated to six promising substitutes for DDT. These are as follows: (1) Malathion, demonstrated to be safe, durable and effective against Anopheles; (2) Carbaryl, useful against lepidoptera, and body louse, safe with precautions; (3) Propoxur, a carbamate, effective against malaria vectors, and safe; (4) Fenitrothion, an organophosphate, persistent on mud walls against mosquitoes, bed bugs, and fleas, safely used with precautions; (5) Dicapthon, an organophosphate, useful against Anopheles, and safe; and (6) Bromophos, an organophosphate, can be used safely against mosquitoes.

[2 figures, 9 tables, 107 references] SW

9.19 REDUCING EVAPORATION PLANT POLLUTION AND ITS TREATMENT

Ronnholm, Arvi A. R. (Eng. Div., Oy W. Rosenlew Ab, Pori, Finland)
Chemical Abstracts 78, No. 6, 31669q (Feb. 12, 1973)

9.19

145 µg./kg., but not by lower doses. The visceral fat accumulated 4.8 µg. endrin per gram of tissue in the 43 µg./kg. exposure and 8.7 µg. endrin per gram tissue in the 145 µg./kg. exposure. The authors concluded that endrin fed to trout caused dysfunction of physiological processes critical to their survival.

[2 figures, 4 tables, 26 references] FTP

9.19 PHOTOCHEMISTRY OF MIREX
(7.9)

Ailey, Earl G., Douglas A. Dollar, Bobby R. Layton, and James P. Minyard, Jr.
(Mississippi State Chemical Laboratory, Mississippi State, MS 39762)
Journal of Agricultural and Food Chemistry 21, No. 1, 138-139 (Jan.-Feb. 1973)

Mirex (dodecachloropentacyclo-[5.3.0.0^{2},6.0^{3},9.0^{4},8]decane has been used in the southern U.S. area to control the fire ant. It may become a possible environmental problem. In the present paper, evidence is presented of the degradation of Mirex by photolysis in hydrocarbon solvents. Two major products were produced; one was a monohydro derivative and the other was a dihydro derivative. The elemental analyses, mass spectra, and nmr spectra indicated that chlorine atoms were replaced with hydrogen atoms.

[6 references] FTP

9.19 [ON THE SITUATION REGARDING THE MERCURY CONTENT IN FISH AND THEIR PREPARATION (FOR FOOD)]
ZUR SITUATION DES QUECKSILBERGEHALTES BEI FISCHEN UND IHREN ZUBEREITUNGEN

Meyer, Victor (Institut für Biochemie und Technologie, Bundesforschungsanstalt für Fischerei, Hamburg, Germany)
P. F. Meyer-Waarden (editor)
Archiv für Fischereiwissenschaft 23, Supplement 1, 20 pp. (Oct. 1972) (Berlin, Germany) (In German)

This report was delivered at a working conference of the Nutrition Scientific Council of the German fish industry held on November 14, 1971 at Bad Godesberg, Germany. The report is in response to concern over the presence of mercury in fish used for food, and it reviews the available information with regard to the possible threat to health. The following subjects are covered, in addition to the introduction: Sources of contamination, toxicity of mercury compounds, analytical methods, exposure to and diagnosis of mercury toxicosis, basis for calculating maximum allowable content, importance of the food chain and influence of contaminated waters, and conclusions with precautions regarding mercury in fish from various waters.

[1 figure, 7 tables, 28 references] SW

9.19 COPPER, ZINC, MERCURY, AND LEAD CONTENT OF SOME ADRIATIC FISHES

Ghisa, Walter, and Mario Giaccio (Ist. Merceol., Univ. Bologna, Bologna, Italy)
Chemical Abstracts 77, No. 8, 52095u (Aug. 21, 1972)

9.19 (1.92)

about 2 ng. per gram. Residues remained without change in fish exposed to high carbaryl in water after 28 days in carbaryl free water. The authors suggest the low residue retention in the fish is due to their capacity to metabolize carbaryl and excrete it.

[2 tables, 7 references] SW

9.3 FDA RELEASES LABELING REGULATIONS

Anonymous
Food Product Development 7, No. 1, 10, 15 (Feb. 1973)

The Food and Drug Administration has released food labeling regulations with emphasis on nutritional content of products. The final effective date is December 31, 1974, but all labels ordered after December 31, 1973 must comply with regulations. A summary of the FDA release follows.

Nutritional labeling is still voluntary, but if nutritional claims are made in advertising or labeling the full nutritional labeling regulations will apply. Where food standards require additional nutrients, full nutritional labeling regulations also apply. The nutritional label will state size of serving, caloric content, content of protein, fat, and carbohydrate in grams per serving, and percentage of U.S. Recommended Dietary Allowance for vitamins and minerals. Declaration of sodium and cholesterol will be permitted without enforcement of the full disclosure regulation.

Compliance testing will be performed on 12 consumer units by methods of the Official Analytical Chemists Association or other reliable procedures.

Two classes of nutrients have been defined relative to declared value. Class I: Added nutrients in fabricated or fortified foods. Class II: Naturally occurring nutrients. For Class I, the vitamin, mineral, and protein content must be equal to or more than the declared values. For Class II, these nutrients must equal at least 80% of the declared values.

(over)

9.3 SYMPOSIUM ON THE RECALL OF FOOD PRODUCTS, 32ND ANNUAL MEETING OF THE INSTITUTE OF FOOD TECHNOLOGISTS

(Various authors and articles as listed below)
Food·Drug·Cosmetic Law Journal 27, No. 11, 660-735 (1972) (Commerce Clearing House, Inc., 4025 West Peterson Ave., Chicago, IL 60646)

"Introductory Remarks--Murphy's Law and Consumer Protection," by Paul Kahn (ITT Continental Baking Co.), pp. 660-661.

The author offered the hope that this symposium would stimulate management of the food industry to prepare in advance for an eventuality [product recall] that everyone hopes will never come.

"Recalls -- Definition and Exposition," by Sam D. Fine (Office of the Commission for Compliance, FDA, PHS, U.S. Dept. of Health, Education, and Welfare, Washington, D.C.), pp. 662-667.

The recall policy of the Food and Drug Administration (FDA) is explained, beginning with basic definitions and delineating internal FDA assignment of responsibility for recall decisions.

"Voluntary Recalls or Delegated Seizures: The Legal Considerations," by Eugene I. Lambert (Covington and Burling, Washington, D.C.), pp. 668-672.

The author discusses the legal considerations, regarding the Food, Drug, and Cosmetic Act and other forms of civil liability, relative to recalls of food (Due to the absence of any specific statutory authority to require recalls, any recall is "voluntary," that is, the firm is not legally obligated to institute the recall).

"Insurance for Product Withdrawal," by John J. Kircher (Defense Research Institute), pp. 673-679.

 (over)

9.3 (1.12) TROPICAL TUNA MANAGEMENT IN THE EASTERN PACIFIC

Joseph, James (Inter-American Tropical Tuna Commission)
Fishing News International 12, No. 2, 12-14, 17 (Feb. 1973)

The tuna fish industry began in the waters between Los Angeles and Catalina Island with the capture of albacore for canning. To ensure a constant source of supply the albacore fleet moved into the waters off northern Mexico where the yellowfin and skipjack tuna could be caught year round. The fishery developed, and by the beginning of World War II, 85,000 short tons (2,000 lb. per ton) of yellowfin and skipjack tuna were taken annually. After a decline during the war years, the catch of the two species increased to 175,000 tons in 1950. The nations bordering the eastern Pacific became concerned, at this time, over the rate of exploitation of not only the tuna species but the bait fish also. The Central American nations had valuable resources in bait fish (used in catching tuna), and the disappearance of the anchoveta, an important bait fish, off the coast of Costa Rica was further cause for concern.

As a result of the concern over the tuna and the bait fish, the Governments of Costa Rica and the United States joined in a treaty to establish the Inter-American Tropical Tuna Commission. The treaty was signed in 1949. The most important duty of the Commission is to make recommendations, on the basis of scientific investigation, to the treaty partners for maintaining the populations of tuna at the levels for maximum sustainable catches.

The first task of the scientific staff was to make a history of catches and catch effort and to start a uniform logbook system of recording current catch

 (over)

9.3 INTERNATIONAL REGULATION OF MARINE FISHERIES. A STUDY IN REGIONAL CO-OPERATION

Koers, Albert W.
Fishing News (Books) Ltd., 23 Rosemount Ave., West Byfleet, Surrey, England (1973). Price £5.50.

According to the publisher, this book is intended to help the evolution of a much needed law of the sea in relation to fisheries. It gives information on the existing international fisheries organizations; it discusses the needs and claims of coastal state fisheries and distant water fisheries; and it outlines the logical pros and cons of conceivable courses within the desired framework of an acceptable basis of international law. The book contains six chapters dealing with: (1) the extra-legal context of the international law of marine fisheries, (2) a chronology of international fisheries organizations, (3) the structure of international fisheries organizations, (4) the functions and powers of the organizations, (5) alternatives and proposals, and (6) a subjective approach to the future international law of the sea.

FTP

9.3

The author discusses the protection that insurance companies offer to manufacturers should they have a recall of food products.

"Production Records: Tracing and Recording of Ingredients," by Alan Thomas (M & M/ Mars, Hackettstown, N.J.), pp. 680-688.

Advice is given on organizing and using codes on invoices of raw materials, quality control records, production schedules, processing records, and a final product identification system, to enable one to identify and locate suspect goods.

"Distribution of Processed Foods," by James Scala (Applied Nutrition, Thomas J. Lipton, Inc.), pp. 689-695.

The author recommends the universal product code for solving the problem of locating suspect goods in distribution.

"Recalls International," by Paul M. Karl (CPC International, Englewood Cliffs, N.J.), pp. 696-701.

The international regulatory framework is described, including the European Economic Community and the Joint FAO/WHO Food Standards Program/ Codex Alimentarius Commission.

"The Removal and Disposal of Suspect Product," by Charles Livingston (Corporate Quality Assurance, Borden, Inc.), pp. 702-708.

The author reviews the process of food recall from alert to disposition of food products.

"Recall of Food Products; Emergency Standby Procedures at the Home Office," by Paul Kahn (ITT Continental Baking Co.) and Donald C. Healton (Regional Food and Drug Director, Region V, FDA), pp. 709-735.

This article deals with the setting up of emergency standby procedures for recalls, adaptable to any organization, which can help avert more serious problems by avoiding preventable pitfalls. [22 illustrations] FTP

9.3

Claims of nutritional superiority of one product over another must be based on a difference of 10% or more. Labeling of health or "natural" foods may not claim that natural sources of nutrients are more nutritious than chemically produced sources. Special dietary foods' labels will be affected by proposed changes to the regulations. The regulations will deal with dietary supplements under one part of the code and will deal with products used under medical supervision in another part of the code. The label "imitation" will no longer be necessary if the product is equal, nutritionally, to the product it resembles, if the proposal for this change is accepted. Declaration of all optional ingredients in all standardized foods will be required except spices, flavorings, and colors. SW

9.3 TOWARDS A BROAD ECOLOGICAL MODEL OF FISH COMMUNITIES AND FISHERIES

Regier, Henry A. (Dept. of Zoology, University of Toronto, Toronto, Ontario, Canada), and H. Francis Henderson (Fish Stock Evaluation Branch, Dept. of Fisheries, FAO, Rome, Italy)

Transactions of the American Fisheries Society 102, No. 1, 56-72 (Jan. 1973)

In attempts to manage the fishery resources, particularly those in fresh waters, evidence is accumulating that the classical fishery models are deficient in the extent and the rates of change through increased impact of humans. The steady state of equilibrium assumptions of population dynamics as simplifications of fishing effects on fish populations are no longer fully accepted. In addition, rapid changes in species composition cannot be incorporated into models of production or economic yield without large increases in data gathering, bookkeeping, and computer facilities.

The authors have constructed a model which they believe overcomes the inadequacies of the classical models. The new model is complex: it includes physical, chemical, biological, and ecological factors. A diagram of the model is shown in the article with mathematical relationships. The authors suggest that the model will provide a context in which theory can be generalized and applied more broadly at less cost.

[5 figures, 30 references] SW

9.3 (1.12)

information. Other studies showed that yellowfin and skipjack tuna are found in nearly all the tropical oceans of the world. They found that yellowfin do not migrate great distances as do the albacore, bluefin, and skipjack. Furthermore, the skipjack in the eastern Pacific are in the adolescent stage and originate in water farther to the west where they return to spawn. Studies showed that yellowfin grow very rapidly; they weigh 130 lb. at 4 years of age. Skipjack are also fast growing but grow no larger than 25 lb. Abundance of fish is dependent on fluctuations in temperatures of the water and food supplies; fishing success is related to the same factors. The staff was able to formulate during the 1950's mathematical models for yellowfin which were useful in providing guidelines for management. The model indicated that a yield of 95,000 tons annually could be supported. By 1961, this yield was exceeded and the need to reduce fishing effort of yellowfin was known; however, skipjack was underfished. The yellowfin fishery has been under management since 1966, and the abundance of the stock has remained high, with a 2-month fishing season in 1972. Thirteen nations have participated in the fishery under the treaty.

The Commission has many complicated problems in the management of the tuna fishery which now operates in the Atlantic also. The Commission has been able to deal with a few of the problems; its present efforts continue on analyses of the catch statistics, the population structure of yellowfin, and improvement of models of the stocks.

[2 figures, 1 table, 1 illustration] SW

9.3 SCIENTIFIC ASPECTS OF MARITIME SOVEREIGNTY CLAIMS

Wooster, Warren S. (Scripps Institution of Oceanography, University of California at San Diego, La Jolla, Calif.)
Ocean Development and International Law Journal 1, No. 1, 13-20 (Spring 1973)
[New journal published by Crane, Russak & Co., Inc., 52 Vanderbilt Ave., New York, NY 10017. Subscription price $26.00, single copy $8.00]

The author compares the scientific arguments used to justify Peruvian claims for extension of maritime sovereignty with available oceanographic information on the eastern South Pacific.
[16 references]

FTP

9.6 FISHERY PUBLICATIONS, CALENDAR YEAR 1970: LISTS AND INDEXES

Engett, Mary Ellen, and Lee C. Thorson
NOAA Technical Report NMFS CIRC-377, iv + 34 pp. (Dec. 1972). U.S. Department of Commerce, NOAA, National Marine Fisheries Service, Seattle, Wash. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. Price 45 cents.

The following series of fishery publications of the National Marine Fisheries Service, National Oceanic and Atmospheric Administration (until October, 1970 the Bureau of Commercial Fisheries of the U.S. Fish and Wildlife Service) in calendar year 1970 are listed numerically (with abstracts) and indexed by author, subject, and geographic area: Circular, Data Report, Fishery Industrial Research, Fishery Leaflet, and Special Scientific Report--Fisheries.
[1 figure]

Authors' abstract

9.6 QUALITY CONTROL IN THE FOOD INDUSTRY VOLUME 3

Herschdoerfer, S. M. (editor)
Published by Academic Press Inc., 111 Fifth Ave., New York, NY 10003. (1972), 485 pp. Price not given.

Volume 1 (previously published) covered the organization of quality control with additional material on chemical and microbiological health problems, statistical methods, tasting panels, and food standards.

Volume 2 (previously published), in addition to other food products, covered fish and fish products.

Although volume 3 covers other fish products, there are chapters of interest to the food processing community. These chapters include: "Flavoring Materials and Their Quality Control," "Quality Control of Prepared Food Mixes," "Quality Assurance of Incoming Packaging Materials for the Food Industry," and "Automatic Control." This last chapter is a discussion of automatic measuring and regulating principles useful in food processing.

SW

9.6 ECOLOGY AND ECONOMICS: CONTROLLING POLLUTION IN THE 70'S
(9.19)

Goldman, Marshall I. (editor)
Published by Prentice-Hall, New Jersey (1972), xi + 233 pp. Price $6.95.
Richard H. Day (reviewer)
Transactions of the American Fisheries Society 102, No. 1, 199 (Jan. 1973)

The variety and extent of pollution and ideas for its abatement are presented in this nontechnical book. The reviewer criticized the book for failure to address itself to the social problem of teaching man to live with less material affluence in order to restore the environment.

SW

9.6 1001 QUESTIONS ANSWERED ABOUT THE OCEANS AND OCEANOGRAPHY

Taber, Robert W., and Harold W. Dubach
Published by Dodd, Mead & Company, New York (1972), 269 pp. Price not given.

The book covers the field of oceanography and is divided into 15 chapters. Most of them are devoted to the physical and geographical aspects of the oceans. However, there are five chapters in the fields of biology, ecology, food, pollution, and man in relation to the sea. The last chapter is about myths and legends.

The style of the book is in the form of questions and answers. There is a bibliography and an index. SW

9.6 MARINE FOOD AND GAME FISHES OF CALIFORNIA

Fitch, John E., and Robert J. Lavenberg
Published by the University of California Press, Berkeley, Calif. (1971), 179 pp.
Price $2.35.
Richard S. Shomura (National Marine Fisheries Service, Tiburon Fisheries Laboratory, Tiburon, CA 94920) (reviewer)
Transactions of the American Fisheries Society 102, No. 1, 202 (Jan. 1973)

The reviewer believes that the book provides the general public with interesting facts on natural history and is a good source of fishery information. SW

9.6 WORLD FISHERIES POLICY: MULTIDISCIPLINARY VIEWS

Rothschild, Brian J. (editor) (National Marine Fisheries Service, NOAA, Southwest Fisheries Center, La Jolla, Calif.)
Published by the University of Washington Press, Seattle, Wash. (1972), 340 pp. Price $9.50.

This book is the result of a series of interdisciplinary seminars sponsored by the Graduate School of Public Affairs of the University of Washington. Fisheries experts from several countries evaluated the effectiveness of past fisheries policies and described concepts and attitudes that may shape future policies.

The book comprises 16 articles which should be of interest to those in the fields of territorial conflicts, fisheries of the developing countries, conservation standards, and allocation of catches. Additional fields of interest include the future world food supply, application of systems analysis and computer technology to improve fisheries management, and the social goals of fisheries management.

The book will be of special interest to participants in the conference on "Law of the Sea" sponsored by the United Nations. SW

9.6 REVIEWS
(1.81)

An Economic Study of the Oyster Fishery of the Maritime Provinces
Morse, N. H.
Fisheries Research Board of Canada Bulletin 175, Ottawa, Canada (1971), 81 pp. Paperback $2.25.

Paralytic Shellfish Poisoning in Eastern Canada
Prakash, J., C. Medcof, and A. D. Tennant
Fisheries Research Board of Canada Bulletin 177, Ottawa, Canada (1971), 87 pp. Paperback $3.00.

Pacific Oyster Raft Culture in British Columbia
Quayle, D. B.
Fisheries Research Board of Canada Bulletin 178, Ottawa, Canada (1971), 34 pp. Paperback $2.00.

Herbert Hidu (Ira C. Darling Center, University of Maine, Walpole, ME 04573) (reviewer)
Transactions of the American Fisheries Society 102, No. 1, 200-201 (Jan. 1973)

The reviewer was impressed with the extensive treatment given to the subject in the first bulletin. He commented that the bulletin on shellfish poisoning was lighter reading but gave all aspects of the problem. Practical instructions for operating an oyster raft culture venture were given in the third bulletin. SW

9.6 THE WATER'S EDGE: CRITICAL PROBLEMS OF THE COASTAL ZONE

Ketchum, Bostwick H. (editor)
Published by the Massachusetts Institute of Technology, Cambridge, Mass. (1972), i-xi + 393 pp. Price not given.

This book contains the reports of the Coastal Zone Workshop, held at Woods Hole, Mass., from May 22 to June 3, 1972. There were 112 participants to the workshop. They contributed reports under two major sections. The first section, "Constraints on Man's Activities," covered the following topics: living resources, nonrenewable resources, recreation and aesthetics, urban and industrial development, transportation, coastline changes, and pollution from waste disposal.

In the second main section, "Management of Coastal Resources," the participants of the workshop reported on the following topics: research strategies, allocating resources, management, legal aspects, and a systems view.

There is a bibliography at the end of each report. There is also a general bibliography and an index. SW

2.3 APPARATUS FOR REMOVING VISCERA FROM A FISH

Wiggins, Gary K.; assignee Marine Construction & Design Co., Seattle, Wash. (pat.)
U.S. Patent 3,707,019 (Dec. 26, 1972)

This apparatus is designed to remove the viscera, and in female fish the roe, from fish prior to the final cleaning operation. It is particularly useful in the processing of salmon. FTP

6.34 DEPENDENCE UPON THE GEL-SOL STATE OF THE ION-EXCHANGE PROPERTIES OF ALGINATES

Smidsroed, Olav, and Arne Haug (Norw. Inst. Seaweed Res., Trondheim, Norway)
Chemical Abstracts 77, No. 24, 154223b (Dec. 11, 1972)

2.3 SHRIMP PROCESSING

Bynagte, P. W.; Westgate-California Foods, Inc. (pat.)
U.S. Patent 3,705,040
Food Technology 27, No. 3, 92 (Mar. 1973)

Shrimp are dipped into a selected aqueous phosphate salt solution for at least 2 min. with agitation, and then they are cooked, cooled, and peeled. FTP

2.3 SHRIMP PROCESSING

Lapeyre, J. M., and R. F. Coret; Laitram Corp. (pat.)
U.S. Patent 3,704,484
Food Technology 27, No. 3, 91-92 (Mar. 1973)

The patent concerns spirally grooved inserts rolls for use in shrimp peeling machines. FTP

6.34 ALGINATE PAPER

Prouse, Ronald Ernest, Anthony Alfred West, Derek Anthony King, and Roger Poulson (Carreras Ltd.) (pat.)
German Offen. 2,212,607 (Oct. 26, 1972)
Chemical Abstracts 78, No. 6, 31732e (Feb. 12, 1973)

9.16 SHELLFISH GROWOUT TRAY

Herolzer, Ralph H.; assignee Vanguard Industries Inc., Cincinnati, Ohio (pat.)
U.S. Patent 3,702,599 (Nov. 14, 1972)

This tray device is used for sustaining the growth of shellfish, such as oysters. FTP

9.16 OYSTER SPAWNING FACILITY

Dunathan, Jay P.; assignee Oceanography Mariculture Industries, Inc., Riviera Beach, Fla. (pat.)
U.S. Patent 3,707,948 (Jan. 2, 1973)

This invention consists of a closed system for conditioning and spawning oysters in a controlled temperature environment. FTP

2.3 FISH FREEZING PROCESS

National Sea Products Ltd. (pat.)
British Patents 1,293,169 and 1,293,170
Food Technology 27, No. 3, 92 (Mar. 1973)

The apparatus forms, under pressure, fillet-shaped portions of raw fish prior to freezing. FTP

Subject	Page	Code
ANALYSIS		
Determination of Froced Drip From the Fish Meat Tissue by the Centrifuging Method	21	7.8
ANALYSIS, INORGANIC		
Rapid Determination of Selenium in Foodstuffs by Neutron Activation Analysis	20	7.42
ANALYSIS, ORGANIC		
Measurement of Formaldehyde in Fish Muscle Using TCA Extraction and the Nash Reagent	19	7.597
Gas-Chromatographic Determination of Volatile Amines	22	7.81
ANTIBIOTICS		
Antibiotics as Feedstuff Additives: the Risk-Benefit Equation for Man	3	0.4
AQUACULTURE		
Studies on Suspended Culture of Oyster Crassostrea gigas in the Korean Coastal Waters. (1) On the Growth Rate of Oyster in Growing Area	25	9.16
Water Levels, Fluctuation, and Minimum Pools in Reservoirs for Fish and Other Aquatic Resources - An Annotated Bibliography	25	9.16
Shell Stringer Apparatus (pat.)	26	9.16
Study on Spat Collection of Oyster (Crassostrea gigas Thunberg)	26	9.16
Oyster Spawning Facility (pat.)	35	9.16
Shellfish Growout Tray (pat.)	35	9.16
AQUACULTURE -- FEEDING AND NUTRITION OF FISH		
Essentiality of Vitamin C in Feeds for Intensively Fed Caged Channel Catfish	24	9.16
AQUACULTURE, PLANTS		
What's It All About?	28	9.19
AUTHOR INDEX	39-40	
BACTERIOLOGY		
Clostridium botulinum and Smoked Fish Production: 1963-1972	5	0.5
Ecology of Vibrio parahaemolyticus in Chesapeake Bay	5	0.5
Public Health Problems Associated With Barbecued Food. A Review	5	0.5
Vibrio parahaemolyticus Methodology for Isolation From Seafoods and Epidemic Specimens	5	0.5
Distribution of Vibrio parahaemolyticus in the Natural Environment	6	0.5
Mysteries and Misconceptions of Sterilization by Steam and Ethylene Oxide	6	0.5
BIBLIOGRAPHIES		
Fishery Publications, Calendar Year 1970: Lists and Indexes	33	9.6
BIOCHEMISTRY		
Cholesterol-Cerebroside Interaction: the Role of α-Hydroxy Fatty Acids	1	0.35
Calcification and Synthesis of Skeletal Organic Material in the Coral, Pocillopora damicornis (L.) (Astrocoeniidae Scleractinia)	2	0.35
Effects of Ionic Strength and pH on Neutral Salt-Soluble Collagen From Sperm Whale Nose Cartilage	2	0.35
Phospholipase of Marine Invertebrates--I. Distribution of Phospholipase A	3	0.38
Organizational Changes in Phospolipid Multibilayers Induced by Uncouplers of Oxidative Phosphorylation: A Spin Label Study	3	0.39
Isolation and Identification of Native Auxins in Marine Algae	4	0.39
The Effects of Local Anesthetics on Lipid Multilayers. A Spin Probe Study	4	0.4
BIOCHEMISTRY OF FISH		
Variations in Serum Constituents of the Blue Crab, Callinectes sapidus: Chloride and Osmotic Concentrations	1	0.35
Ascorbic Acid and Fat Content in the Red and White Muscles of Carp, Catla catla	1	0.36
Hexose Monophosphate Accumulation and Related Metabolic Changes in Unfrozen and Thawed Adductor Muscle of the Sea Scallop (Placopecten magellanicus)	1	0.36
FISH PROTEIN CONCENTRATE		
Further Studies on the Availability of the Fluoride in Fish Protein Concentrate	18	6.54
FISHERIES, ASIA --TAIWAN		
A Marine Biological Survey of Southern Taiwan With Emphasis on Corals and Fishes	7	1.0152
FISHERIES, MARINE -- TUNAS		
Tropical Tuna Management in the Eastern Pacific	31	9.3
FISHERIES, MOLLUSCS -- CLAMS		
The Clam Fisheries of British Columbia	8	1.82
FISHERY MANAGEMENT		
Variations in Catchability of Fishes With Color of Gillnets	25	9.17
Application of Theory and Research to Freshwater and Marine Fisheries Management	26	9.17
Towards a Broad Ecological Model of Fish Communities and Fisheries	32	9.3
FISHING METHODS -- ELECTRICAL		
Fish Harvesting Method and Apparatus (pat.)	10	2.143
FISHING METHODS -- TRAWLING		
Study on the Hydrodynamic Properties of Mid-Water Trawl--II.	9	2.1471
Experimental Studies on the Mechanical Properties of Trawl Net	10	2.1471
FREEZE-DRYING		
Influence of Frozen State Reactions on Freeze-Dried Foods	16	3.60
FRESH FISH -- HANDLING		
Do's and Don'ts of Refrigerated Vehicles	14	3.25
FROZEN FISH		
Thiobarbituric Acid Value, Total Long-Chain Free Fatty Acids, and Flavor of Pacific Halibut (Hippoglossus stenolepis) and Chinook Salmon (Oncorhynchus tshawytscha) Frozen at Sea	11	3.2340
Flesh Concentration of Various Long-Chain Free Fatty Acids of Pacific Halibut (Hippoglossus stenolepis) and Chinook Salmon (Oncorhynchus tshawytscha) Frozen at Sea	13	3.2340
Flesh pH, Color, Thaw Drip, and Mineral Concentration of Pacific Halibut (Hippoglossus stenolepis) and Chinook Salmon (Oncorhynchus tshawytscha) Frozen at Sea	13	3.2340
FROZEN FISH -- PACKAGING		
A Method of Production of Deep Frozen Fish Fillet (pat.)	14	3.2343
FROZEN FISH -- QUALITY		
Parameters of Textural Change in Frozen-Stored Cooked Lobster (Homarus americanus) Tail Muscle	13	3.2495
FROZEN FISH -- STORAGE		
Changes in the Flesh Lipids of Fish During Freeze Storage. III. Relation Between Rancidity in Fish Flesh and Protein Extractability	12	3.239
FROZEN FISH -- THAWING		
Thawing of Fish and Fishery Products	13	3.27
GEAR, FISHING -- ELECTRIC TRAWL		
The Catching Efficiencies of a 21.3-Meter (Headrope) Standard Wing Trawl and a 21.3-Meter Electrical Wing Trawl in the Saginaw Bay Area of Lake Huron	9	2.1471
GEAR, FISHING -- SET NET		
Set Net Experiment With Major Implications for New Zealand	11	2.1474
HATCHERY PRACTICES		
An Evaluation of Striped Bass Fingerling Culture	25	9.16
LAW, FOOD AND DRUG		
Symposium on the Recall of Food Products, 32nd Annual Meeting of the Institute of Food Technologists		
Insurance for Product Withdrawal	31	9.3
Introductory Remarks--Murphy's Law and Consumer Protection	31	9.3
Recalls -- Definition and Exposition	31	9.3
Voluntary Recalls or Delegated Seizures: The Legal Considerations	31	9.3

BIOCHEMISTRY OF FISH--Continued
Electrophoretic Study of Serum Proteins and Crystallin of Merluche of the Northwest African Coast 2 0.33
Some Physico-Chemical Characteristics of Carp Myosin B 2 0.35
Determination of Zinc-65 Specific Activity in Various Tissues of the California Sea Mussel, Mytilus californianus 6 0.39
Seasonal and Local Variations in Odd-Chain Fatty Acid Levels in Nova Scotian Rainbow Smelt (Osmerus mordax) 15 4.13
BIOLOGY OF MARINE REPTILES
The Pacific Ridley Turtle in Japanese and Adjacent Waters 9 1.93
BOOKS
Ecology and Economics: Controlling Pollution in the 70's 33 9.6
Quality Control in the Food Industry. Volume 3 33 9.6
Marine Food and Game Fishes of California 34 9.6
1001 Questions Answered About the Oceans and Oceanography 34 9.6
Reviews
An Economic Study of the Oyster Fishery of the Maritime Provinces 34 9.6
Pacific Oyster Raft Culture in British Columbia 34 9.6
Paralytic Shellfish Poisoning in Eastern Canada 34 9.6
The Water's Edge: Critical Problems of the Coastal Zone 34 9.6
World Fisheries Policy: Multidisciplinary Views 34 9.6
CHEMISTRY OF THE OCEAN
Struvite and Prebiotic Phosphorylation 21 8.4
COMPOSITION, ORGANIC
7-Methyl-7-Hexadecenoic Acid: Isolation From Lipids of the Ocean Sunfish Mola mola (Linnaeus) 1758 16 4.15
CONSERVATION
Exotic Aquatic Organisms in Florida With Emphasis on Fishes: A Review and Recommendations 27 9.17
DISEASES OF FISH
Studies on the Occurrence and Biochemical Properties of Virulent and Avirulent Strains of Freshwater Fish Pathogen, Aeromonas liquefaciens 23 9.15
DRIED FISH
Studies on the Processing Method and Taste Compounds of Dehydrated Alaska Pollack
(I) Changes of Nucleotides and Their Related Compounds and Free Amino Acid Composition of Alaska Pollack During Hot-Air Dehydration 15 3.64
(II) Some Methods for Hot-Air Dehydration of Alaska Pollack 16 3.63
ECOLOGY
Zinc-65 in Benthic Invertebrates Off the Oregon Coast 22 9.11
ENGINEERING
Removal of Odours by Catalytic Incineration 10 0.8
ENVIRONMENT
Seasonal and Areal Distribution of Radionuclides in the Biota of the Columbia River Estuary 24 9.11
ENZYMES
Simultaneous Partial Purification of Sterol Ester Hydrolase and Lipase From Rabbit Pancreas 3 0.38
Method for the Determination of Lipoprotein Lipase in Postheparin Plasma and Body Tissues Utilizing a Triolein-Coated Celite Substrate 4 0.38
EQUIPMENT, PLANT
Bacteria: Friends or Foes? 8 0.8
Apparatus for Removing Viscera From a Fish (pat.) 35 2.3
Fish Freezing Process (pat.) 35 2.3
Shrimp Processing (pat.) 35 2.3
FEEDING AND NUTRITION OF FISH
Amino Acids Essential for the Growth of Eels, Anguilla anguilla and Anguilla japonica 24 9.14
LAW, FOOD AND DRUG--Continued
Distribution of Processed Foods 32 9.3
Production Records: Tracing and Recording of Ingredients 32 9.3
Recall of Food Products: Emergency Standby Procedures at the Home Office 32 9.3
Recalls International 32 9.3
The Removal and Disposal of Suspect Product 32 9.3
LAW, INTERNATIONAL
International Regulation of Marine Fisheries. A Study in Regional Co-operation 31 9.3
Scientific Aspects of Maritime Sovereignty Claims 33 9.3
NEW PRODUCTS -- FISH
Pilot Plant Production of and Large Scale Acceptance Trials With Quick Salted Fish 19 6.54
NUTRITION
Evaluation of Linear Programming Techniques in Formulating Human Diets With Rat-Feeding Tests 6 0.7
Chromium in Foods in Relation to Biological Activity 7 0.7
Effect of Protein and Methionine on Vitamin A Liver Storage in Rats Fed DDT 7 0.7
The Two Faces of Selenium--Can Selenophobia Be Cured? 7 0.7
FDA Releases Labeling Regulations 31 9.3
NUTRITION, ANIMAL
Marine Fat. Digestibility of Its Fatty Acids in Young Calves 18 4.82
NUTRITION, FISH
Nutritional Requirements of the Gilthead Bream Chrysophrys aurata. Quantitative Protein Requirements 23 9.14
OCEANOGRAPHY
On the Oceanographic Condition for Albacore in the Western South Pacific Ocean 21 9.11
Studies on the Osmotic Pressure of Environmental Media and Body Fluid of Marine Fish--I. The Osmotic Pressure of the Sea Water on the Migrating Route of Pelagic Marine Fish 22 9.11
Cooperative Gulf of Mexico Estuarine Inventory and Study, Florida: Phase 1, Area Description 23 9.11
OXIDATION
Effects of Surface Concentration, Metals and Acid Synergists on Autoxidation of Linoleic Acid Monolayers on Silica 15 4.5
Autoxidation of Fatty Acid Esters in the Presence of a Heavy Metal Catalyst "Salcomine" (Co[II]-Bissalicylalethylenedi-mine):
I. Effect of Catalysts Upon Rate of Consumption of Oxygen and Decomposition of Hydroperoxide 17 4.5
II. Formation of a Reaction Product From a Peroxy Radical and Salcomine 17 4.5
Studies on the Metal-Protein Complex. III. Relationship Between the Binding Ability of Various Inorganic Metal-Protein Complex and Activity of Metal-Catalyzed Autoxidation 18 4.5
PASTEURIZATION
Some Considerations on Preserving Shrimps (Crangon vulgaris) 15 3.33
PLANTS, AQUATIC -- ANALYSIS
Biochemical Studies on Marine Algal Constituents. II. Evaluation of the Extraction and Purification of Alginic Acid From Cystoseira barbata 4 0.39
Dependence Upon the Gel-Sol State of the Ion-Exchange Properties of Alginates 35 6.34
PLANTS, AQUATIC -- COMPOSITION
Studies on the Components of Naga-Kombu, Laminaria longissima--II. Inorganic Elements 17 6.32
Ecological Studies of Economic Red Algae. IV. Variations of Carrageenan Concentrations and Properties in Chondrus crispus Stackhouse 19 6.35

Subject	Page	Code
PLANTS, AQUATIC -- PRODUCTS		
Industrial Utilization of Zoster	20	6.36
Alginate Paper (pat.)	35	6.34
POLLUTANTS		
Oxygen-Consuming Organic Matter (BOD) in Effluents Originating in Different Pulping Processes of the Woodworking Industry. Review of Literature During the Years 1960-1970	28	9.19
Copper, Zinc, Mercury, and Lead Content of Some Adriatic Fishes	30	9.19
POLLUTANTS -- ANALYSIS		
Analysis of Polychlorinated Biphenyls by Gas Chromatography and Ultraviolet Irradiation	29	9.19
Photochemistry of Mirex	30	9.19
POLLUTANTS -- DISTRIBUTION		
What Do the Hydrocarbons From Trees Contribute to Air Pollution?	28	9.19
POLLUTANTS -- EFFECTS ON FLORA AND FAUNA		
Biological Aspects of Themal [sic] Pollution. II. Scientific Basis for Water Temperature Standards at Power Plants	27	9.19
Effects of the Polychlorinated Biphenyl Aroclor 1254 on American Oyster Crassostrea virginica	27	9.19
Endrin Toxicosis in Rainbow Trout (Salmo gairdneri)	29	9.19
The Uptake and Persistence of Carbaryl in Channel Catfish	29	9.19
[On the Situation Regarding the Mercury Content in Fish and Their Preparation (For Food)]	30	9.19
POLLUTANTS -- RESIDUES		
A Survey of Mercury Residue in Fish Caught by Taiwan's Fishing Vessels	19	7.42
POLLUTION		
Marine Pollution and Sea Life	27	9.19
POLLUTION -- ABATEMENT		
Reducing Evaporation Plant Pollution and Its Treatment	30	9.19
PRESERVATION -- IRRADIATION		
Economic and Technological Study of the Irradiation of Shrimps (Crangon vulgaris Fabr.)	11	3.19

Subject	Page	Code
PRESERVATIVES		
Studies on Curing of Meat Products--II. Degradation of Nitrate and Nitrite During Meat Curing	11	3.12
On the Effectiveness of EDTA in Prolonging the Shelf Life of Fresh Fish	12	3.12
Fish Processing (pat.)	12	3.12
PROCESSING		
Shrimp Processing (pat.)	35	2.3
PROTEIN CONCENTRATES		
Protein-Enriched Cracker for Combat Rations	20	6.54
QUALITY CONTROL		
Psychophysical Measures of Texture	22	7.8
Consumer Awareness of and Attitudes to Food Texture. II. Children and Teenagers	22	8.8
QUALITY CONTROL -- OBJECTIVE TESTS		
Bacteriological Survey of the Blue Crab Industry	21	7.85
SAFETY		
Fatal Poisoning and Other Health Hazards Connected With Industrial Fishing	10	2.119
SALMON		
Food of Juvenile Pink and Chum Salmon in Puget Sound, Washington	23	9.12
SMOKE PROCESSING		
Laboratory Quality Control of the Smoking Liquid in the Smoked Fish Industry	22	8.8
SPOILAGE		
Studies on the Variation of the Freshness of Fishes During the Storage in Ice	9	2.00
Protection of Smoke-Dried Freshwater Fish From Insect Damage During Storage in Zambia	14	3.4
TOXICOLOGY		
Observations on the Role of Vitamin E in the Toxicity of Oxidized Fats	17	4.92
DDT Substitutes	29	9.19
VITAMINS		
Chemistry of Thiamine Degradation in Food Products and Model Systems: A Review	18	5.2

Author	Page	Code
Abdel-Fattah, A. F.	4	0.39
Abe, Hiroshi	4	0.39
Ackman, R. G.	15	4.13
--	16	4.15
Addison, R. F.	15	4.13
Akahane, Yoshiaki	11	3.12
Akesson, C.	22	7.8
Alley, Earl G.	30	9.19
Anonymous	11	2.1474
" (pat.)	14	3.2340
"	31	9.3
" (pat.)	35	2.3
Arai, Shigeru	24	9.14
Arnold, Roy G.	18	5.2
Audoire, P. J.	20	6.54
Austin, George E. (pat.)	26	9.16
Bae, Gyung Man	25	9.16
--	26	9.16
Bae, Pyung Arm	25	9.16
--	26	9.16
Bak, Hong Jo	9	2.00
Baross, J.	6	0.5
Barrera, R.	22	7.81
Bills, Donald D.	29	9.19
Bosch, Virgilio	4	0.38
Botta, J. R.	11	3.2340
--	13	3.2340
--	13	3.2340
Bourne, N.	8	1.82
Butler, K. W.	4	0.4
Bynagte, P. W. (pat.)	35	2.3
Carey, Andrew G., Jr.	22	9.11
Castell, C. H.	19	7.597
Chang, W. H.	19	7.42
Cheng, Ying-min	7	1.0152
Chow, Yau-Shou	9	2.1471
Chu, Ar Jone	22	9.11
Chun, S. Y.	20	7.42
Ciusa, Walter	30	9.19
Coble, Daniel W. (ed.)	26	9.17
Colwell, Rita R.	5	0.5
Coret, R. F. (pat.)	35	2.3
Cortesi,Reto	17	4.92
Courtenay, Walter R., Jr.	27	9.17
Coutant, C. C.	27	9.19
Cumming, Kenneth B.	25	9.16
Dagbjartsson, Bjorn	13	3.2495
Dalgaard, J. B.	10	2.119
Day, Richard H. (rev.)	33	9.6
Declue, L. W.	6	0.7
Del Valle, F. R.	19	6.54
Dencker, F.	10	2.119
Dollar, Douglas A.	30	9.19
Drake, B.	22	7.8
Drelichowski, L.	21	7.8
Dubach, Harold W.	34	9.6
Dulac, F.	20	6.54
Dunathan, Jay P. (pat.)	35	9.16
Dwivedi, Basant K.	18	5.2
Dyer, W. J.	1	0.36
Ellis, James E.	9	2.1471
Engett, Mary Ellen	33	9.6
Ernst, Robert R.	6	0.5
Fallentin, B.	10	2.119
Fine, Sam D.	31	9.3
Fishbein, Morris	5	0.5
Fitch, John E.	34	9.6
Flatlandsmo, Knut	18	4.82
Flink, James M.	16	3.60
Forster, William O.	24	9.11
Foster, J.	27	9.19
Foulds, Jon Marquis	28	9.19
Fraser, J. C.	25	9.16
Frost, Douglas V.	7	0.7
Fukumoto, J. (pat.)	12	3.12
Fuller, Stephen W.	19	6.35
Gale, G. O.	3	0.4
Gasco, L.	22	7.81
Gerke, Robert J.	23	9.12
Gerrard, F.	14	3.25
Giaccio, Mario	30	9.19
Goldman, Marshall I. (ed.)	33	9.6
Grant, Blake F.	29	9.19
Han, Bong Ho	15	3.64
Hanaoka, Tasuku	22	9.11
Handschuh, G. J.	21	8.4
Hannan, Ellen J.	29	9.19
Hansen, P.	10	2.119
Hashimoto, Yoshiro	24	9.14
Haug, Arne	35	6.34
Healton, Donald C.	32	9.3
Henderson, H. Francis	32	9.3
Henick, A. S.	15	4.5
Herolzer, Ralph H. (pat.)	35	9.16
Herring, Jeffry L.	29	9.19
Herschdoerfer, S. M. (ed.)	33	9.6
Hidu, Herbert (rev.)	34	9.6
Hill, Penelope L.	1	0.35
Hiltz, Doris Fraser	1	0.36
Hingley, J.	15	4.13
Ho, Chuan-Hong	9	2.1471
Hooper, S. N.	16	4.15
Hopkins, D. T.	6	0.7
Hosoda, Kiichi	17	6.32
Houwing, H.	15	3.33
Hovart, P.	11	3.19
Howing, H. [Houwing]	13	3.27
Humphries, Earl T.	25	9.16
Hussein, M. M.	4	0.39
Igarashi, Hisanao	12	3.239
Ishii, Kiyohiko	21	9.11
Jang, Dong Suk	9	2.00
Jarvi, Pentti K.	17	4.5
Jarvi, Pentti K.	17	4.5
Jester, Douglas B.	25	9.17
Jones, Robert S.	7	1.0152
Joseph, James	31	9.3
Jung, Hyung Gyoo	9	2.00
Kaczynski, Victor W.	23	9.12
Kaempe, B.	10	2.119
Kahn, Paul	31	9.3
--	32	9.3
Kajimoto, Gorō	18	4.5
Kami, Harry T.	7	1.0152
Kaneko, Tatsuo	5	0.5
Karel, Marcus	16	3.60
Karl, Paul M.	32	9.3
Kemp, G. A.	3	0.4
Ketchum, Bostwick H. (ed.)	34	9.6
Kim, Kyung Sam	15	3.64
Kim, Kyung Soon	16	3.63
Kim, Yong Gun	15	3.64
--	16	3.63
Kimura, Shigeru	2	0.35
King, Derek Anthony (pat.)	35	6.34
Kircher, John J.	31	9.3
Kiser, J. S.	3	0.4
Koers, Albert W.	31	9.3
Korn, Sidney	29	9.19
Kow, Guang-Hsiung	23	9.15
Krishnamoorthy, R. V.	1	0.36
Krumbiegel, Edward R.	5	0.5
Kubota, Minoru	2	0.35
Kuusi, T.	12	3.12
Lagally, Herta R.	18	6.54
Lambert, Eugene I.	31	9.3
Lanteaume, M. Th.	20	6.54
Lapeyre, J. M. (pat.)	35	2.3
Lapshin, I. I.	22	8.8
Larsen, Ingvar Lauren	6	0.39
Lavenberg, Robert J.	34	9.6
Layton, Bobby R.	30	9.19
Le Clerc, A. M.	20	6.54
Lee, Eung Ho	15	3.64
Lee, Eung Ho	16	3.63
Lee, Tsann-Jan	10	2.1471
Levasseur, L. A.	15	4.5
Lindall, William N., Jr.	23	9.11
Liston, J.	6	0.5
Livingston, Charles	32	9.3
Lovell, Richard T.	24	9.16
Lowe, J. I.	27	9.19
Löytömaki, M.	12	3.12
Luquet, P.	23	9.14
Lynch, M. P.	1	0.35
Mak, Shiu-man	7	1.0152
Mathieson, Arthur C.	19	6.35
McNulty, J. Kneeland	23	9.11
Medcof, C.	34	9.6
Mehrle, Paul M.	29	9.19
Metcalf, Robert L.	29	9.19
Mertz, Walter	7	0.7
Meyer, Victor	30	9.19
Mickel, Hubert S.	1	0.35
Minyard, James P., Jr.	30	9.19
Mitchell, G. V.	7	0.7
Mogilevskii, I. M.	20	6.36
Mori, Kazuo	11	3.12
Moise, John R. (pat.)	10	2.143
Morin, Robert J.	3	0.38
Morse, N. H.	34	9.6
Moskowitz, H. R.	22	7.8
Narasimhan, T.	1	0.36
Naumov, V. N.	20	6.36
Nishimura, Saburo	9	1.93
Nose, Takeshi	24	9.14
Orgel, L. E.	21	8.4
Osterberg, Charles	24	9.11
Oyabu, Suekazu	11	3.12
Pace, Paul J.	5	0.5
Padilla, M.	19	6.54
Panasyuk, V. G.	20	6.36
Paradis, M.	16	4.15
Parrish, P. R.	27	9.19
Patrick, J. M., Jr.	27	9.19
Peeler, James T.	21	7.85
Phillips, Fred A.	21	7.85
Phyun, Jae Hyung	16	3.63
Pichot, P.	2	0.33
Pickering, Edward N.	9	2.1471
Pivnick, H.	5	0.5
Podeszewski, Z.	21	7.8
Polansky, Marilyn M.	7	0.7
Porter, W. L.	15	4.5
Posner, Israel	4	0.38
Poulson, Roger (pat.)	35	6.34
Prakash, J.	34	9.6
Privett, O. S.	17	4.92
Proctor, D. L.	14	3.4
Prouse, Ronald Ernest (pat.)	35	6.34
Pyeun, Jae Hyeung	2	0.35
Quayle, D. B.	8	1.82
--	34	9.6
Ramel, P.	20	6.54
Randall, Richard H.	7	1.0152
Rasmussen, Reinhold A.	28	9.19
Regier, Henry A.	32	9.3
Renfro, William C.	24	9.11
Reutzel, L. F.	6	0.7
Rhee, Sang Kwan	9	2.00
Richards, J. F.	11	3.2340
--	13	3.2340
--	13	3.2340
Robins, C. Richard	27	9.17
Rodina, T. G.	22	8.8
Rodriguez, R.	19	6.54
Roginski, Edward E.	7	0.7

Author	Page	Code
Ronnholm, Arvi A. R.	30	9.19
Rothschild, Brian J. (ed.)	34	9.6
Ruivo, Mario (gen.ed.)	27	9.19
Ruz, A.	19	6.54
Sabaut, J. J.	23	9.14
Safe, L.	16	4.15
Safe, S.	16	4.15
Saito, Shoji	21	9.11
Salem, H. M.	4	0.39
Sato, Rokuro	4	0.39
Scala, James	32	9.3
Schietecatte, P.	11	3.19
Schneider, H.	4	0.4
Schneider, Henry	3	0.39
Searles, R. A.	10	0.8
Seward, C. R.	7	0.7
Shirai, Kazuo	9	1.93
Shomura, Richard S. (rev.)	34	9.6
Smidsroed, Olav	35	6.34
Smith, Barbara	19	7.597
Smith, Ian C. P.	3	0.39
--	4	0.4
Solberg, Myron	13	3.2495
Steensberg, J.	10	2.119
Stillings, B. R.	18	6.54
Su, Wei-Cheng	9	2.1471
Sugihara, Chioyta	9	1.93
Sun, C. T.	19	7.42
Suppes, Z. S.	3	0.38
Sykes, James E.	23	9.11
Szczesniak, A. S.	22	8.8
Taber, Robert W.	34	9.6
Takama, Kozo	12	3.239
Tatsuki, Takeshi	9	1.93
Tennant, A. D.	34	9.6
Thomas, Alan	32	9.3
Thorson, Lee C.	33	9.6
Todd, E.	5	0.5
Toepfer, Edward W.	7	0.7
Tomlinson, N.	11	3.2340
Tomlinson, N.	13	3.2340
--	13	3.2340
Totterman, Harald	28	9.19
Uchida, Naoyuki	2	0.35
Uchiyama, Masaaki	4	0.39
Valverde, F.	22	7.81
Van Engel, W. A.	1	0.35
Vaskovsky, V. E.	3	0.38
Verma, Surendra P.	3	0.39
Vyncke, W.	11	3.19
Webb, K. L.	1	0.35
Wentz, Barry	5	0.5
West, Anthony Alfred (pat.)	35	6.34
Wiggins, Gary K. (pat.)	35	2.3
Wilcke, H. L.	6	0.7
Wilhardt, P.	10	2.119
Woods, George A.	8	0.8
Wooster, Warren S.	33	9.3
Yakushova, L. P.	22	8.8
Yamamoto, Yasuo	11	3.12
Yang, Syng Taek	15	3.64
--	16	3.63
Yoshida, Hiromi	18	4.5
Young, M. L.	7	0.7
Young, Stephen D.	2	0.35
Yver, M.	20	6.54
Zama, Koichi	12	3.239
Zipkin, I.	18	6.54
Zook, Elizabeth	18	6.54

GPO 988-025

THE SECRETARY OF COMMERCE HAS DETERMINED THAT THE PUBLICATION OF THIS PERIODICAL IS NECESSARY IN THE TRANSACTION OF THE PUBLIC BUSINESS REQUIRED BY LAW OF THIS DEPARTMENT. USE OF FUNDS FOR PRINTING THIS PERIODICAL HAS BEEN APPROVED BY THE DIRECTOR OF THE OFFICE OF MANAGEMENT AND BUDGET THROUGH FEBRUARY 15, 1974.

MARINE FISHERIES ABSTRACTS

Editorial Staff

Frank T. Piskur ..... Editor
Samuel Waterman ..... Associate Editor
Gladys K. Chandler ..... Editorial Assistant

MARINE FISHERIES ABSTRACTS is available free in limited numbers to libraries, research institutions, and State and Federal Agencies. It is also available in exchange for other scientific publications. Requests for instatement on the mailing list should be addressed to

National Marine Fisheries Service
Scientific Publications Staff
Bldg. 67, Naval Support Activity
Seattle, Washington 98115.

REPRINTS of articles or other material from which abstracts are drawn should be requested either from the author or from the publishing outlet.

CODE NUMBERS used to identify the subject of abstracts are translated in Fishery Leaflet No. 232, "Fishery Technological Abstract Card System." The Leaflet is for sale by the National Technical Information Service, U.S. Department of Commerce, Sills Building, Springfield, VA 22151. Price $3.00. Accession Number COM-12-10329.

The National Marine Fisheries Service (NMFS) does not approve, recommend or endorse any proprietary product or proprietary material mentioned in this publication. No reference shall be made to NMFS, or to this publication furnished by NMFS, in any advertising or sales promotion which would indicate or imply that NMFS approves, recommends or endorses any proprietary product or proprietary material mentioned herein, or which has as its purpose an intent to cause directly or indirectly the advertised product to be used or purchased because of this NMFS publication.

UNITED STATES
DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL MARINE FISHERIES SERVICE
SCIENTIFIC PUBLICATIONS STAFF
ROOM 450
1107 N.E. 45TH ST.
SEATTLE, WA 98105

OFFICIAL BUSINESS

FOURTH CLASS

POSTAGE AND FEES PAID
U.S. DEPARTMENT OF COMMERCE
COM-210